THE KANSAS UNIVERSITY SCIENCE BULLETIN.

Vol. XIII, No. 11—July, 1922.

CONTENTS:

A Rainfall Period Equal to One-ninth the Sun-spot Period,
Dinsmore Alter.

PUBLISHED BY THE UNIVERSITY,

LAWRENCE, KAN.

Entered at the post office in Lawrence as second-class matter.

9-3728

THE KANSAS UNIVERSITY SCIENCE BULLETIN.

VOL. XIII.] JULY, 1922. [No. 11.

A Rainfall Period Equal to One-ninth the Sun-spot Period.

DINSMORE ALTER.

SYNOPSIS.

PRELIMINARY discussions based on the rainfall of the United States have been published in the *Monthly Weather Review* and the *University of Kansas Science Bulletin.* The present paper completes the investigation of this period, using much longer records and the data from the United States, Northern Europe, Central Siberia, the Punjab in India, Chile, South Australia, Jamaica and Madagascar. Numerous tables and curves are given. The conclusion reached is that the period does exist, and that the relationship to sun spots is not a direct one, but due to an unknown common cause. In purely continental areas, minimum rainfall is connected with a maximum of sun spots; in purely marine, with a minimum of sun spots. For areas with rainfall between these types the period is not plainly found.

INTRODUCTORY.

In August, 1915, Dr. A. E. Douglass read a very interesting paper before the Berkeley meeting of the American Astronomical Society regarding an investigation of the growth of trees in many parts of the world, indicating an eleven-year period in rainfall (1).

It seemed to me that the data collected by the Weather Bureau should definitely settle such a question of periods. Some preliminary reading showed, however, that a tremendous amount of time had been spent on the problem (2), and that if solvable it must be very complicated. Other work prevented starting any actual investigation; then the war intervened and the problem was untouched till the spring of 1919. The first data examined were those from

Lawrence, Kan., where records since 1868 are available. Several hundred hours of work showed nothing. Once a stretch of five years was found which resembled another five quite closely after eliminating the seasonal curve. Another time resemblances were found after about twenty-two years. All such were easily explainable as accidental. It seemed useless to carry the work further with the data at hand.

A paper by Professor Turner (3), however, gave me a new suggestion, although there was little if any logical reason for any connection. In this paper Professor Turner shows plainly the existence of a period in earthquakes with a length between 14.8421 and 14.-8448 months. It occurred to me that this period might be commensurable with the sun-spot period. Upon multiplying it by 9, I obtained 11.13 years, which is the mean sun-spot period to the exact hundredth of a year. Such an exact coincidence is very probably not accidental (4*a*).

The next move was to examine all sun-spot data in order to find whether such a period also exists in sun spots. The results have been inconclusive, some evidence favoring the existence of the period, but not being definite enough to settle the question either way. The general conclusion seems to be that any relationship of sun spots to weather is not a direct one, and that periodicities which are commensurable may exist in each separately, as might happen if the variations were due to a common cause. This will be more fully developed in the general discussion of results.

In three preliminary papers (4*b*) I have investigated the rainfall of the United States, and in them arrived at the conclusion that they afford evidence toward the existence of the rainfall periodicity. When these papers were published it was recognized that they did not constitute proof, that data were needed from all parts of the world and, as Marvin (5) stated in a critical discussion, long records were needed. Since the publication of the first papers I have been gathering all available data, much of it in unpublished manuscripts sent me by meteorologists from many countries of the world. The reduction of these data has been a long job, even requiring hundreds of hours to prepare a single table. For example, the rainfall of many separate stations were given for Sweden; these had to be combined as one table. The same was true of the Punjab in India, where data from twenty-five stations were copied out of Eliot's book and averaged to give a district record to 1900. After that it was necessary to borrow seventeen large volumes and copy a little

from each to complete the tables. To complicate the task, these data were given for fifty-five districts during the early years and for thirty-three during the later. From some countries averages made correctly were sent in form to use, but in the main the data, as secured, required much work to put it in a form to begin the investigation. Such tables are added to this paper in order that other investigators may be saved the preliminary computations. All long records have been studied, with the exception of Canada, which is so close to the United States that it was felt the results secured would not be worth the work of averaging many stations together to get district values in usable form. In the proper places comments will be made on the methods of securing district averages in the United States and other countries. It is believed that many of these should be remade.

MATERIAL SUITABLE FOR HARMONIC ANALYSIS.

A mass of observational material, when plotted with time as abscissæ and observed values as ordinates, may show no repetition of the same curve, even though such a curve might exist. There may be nothing definite about it to indicate a period. In such cases ordinary methods of harmonic analysis become useless. This failure to repeat values, when a period exists, may be due to any one or more of the four following causes:

(*a*) Incommensurable periods may coexist. In this case the curve will never repeat itself, although for short periods of time there may be a fairly close approximation to such repetition. If there are three or more incommensurable periods the curve obtained for the data is very complex. For example, the seasonal variation of the rainfall would be incommensurable with a possible one equaling the sun-spot period. Of course, if one of such periods is known, as in the case of the seasonal variation in the example above, it may be eliminated.

(*b*) There may be large accidental errors. Such errors mask a periodicity almost completely in any one cycle and disappear only when the data values in each of a number of well-distributed phases are added through many cycles. From the theory of errors, their influence will be inversely proportional to the square root of the number of cycles added.

(*c*) Long-period variations may exist. If there are periods longer than the interval of the data they will produce much the same effect as accidental errors or incommensurable periods.

(*d*) There may be periods which vary in length. An example of such a period is the sun-spot period, which, although averaging

11.13 years, has varied from 7.3 to 17.1 years during the last 115 years.

When any of these four difficulties exists it is almost impossible successfully to treat the problem unless the investigator stumbles upon the true period, either by a fortunate suggestion or by some reason extraneous to the problem, or by the patient trial-and-error method by which Kepler found his three laws of planetary motion. Schuster (6) has developed a method designated as the periodogram, which will avail in some cases.

METHOD USED BY TURNER IN EXAMINING THE EARTHQUAKE DATA.

The exact form of this method seems to be due to Schuster (6), and is a slight modification of the one astronomers have used for generations. Suppose that we have a mass of material—for example, the number of earthquakes recorded per month, or the rainfall per month—through many years. Plotting shows no periodicity, or at the most only a faint hint of such. Chance or Schuster's periodogram leads us to suspect a period of, for example, 15 months. We can write the first 15 months' data in a row as the heads of as many columns. The sixteenth month, the thirty-first, etc., will follow successively in the first column, the seventeenth, thirty-second, etc., in the second column, and so on, the thirtieth, forty-fifth, etc., in the fifteenth column. Each column will then contain only months which are in the same phase of the suspected period, if it actually exists.

We will refer to one such row as a cycle, and to the columns as phases. Suppose the period to exist. It may not show in a single cycle, probably will not, because of large accidental errors or incommensurable periods, either or both of which may be present. But the months of any phase of an incommensurable period will, in the long run, be almost evenly distributed through all the phases of our assumed period, and will, therefore, be subject to the same laws as accidental errors, namely, their influence will be inversely proportional to the square root of the number of cycles. In the course of four cycles (five years in our present example) their importance will be only half as great as for any one cycle; after sixteen cycles one-quarter as great, etc. However, the effect of our assumed fifteen-month period will be equal in each, and therefore as prominent in the average as in any one cycle. Thus, no matter how large the accidental errors, or the variation due to incommensurable periods, the true variation from phase to phase will begin to appear.

If the assumed period does not exist, the mean values of the phases will approach each other as we increase the number of cycles.

This last point gives us two very powerful criteria for the verity of our assumed period:

(*a*) Having given *a large number of cycles*, we may compare the phase values of the first half of the cycles with those of the latter half. If the variation be real the curves from the two halves of the data should agree fairly well. If the variation be accidental there can be only chance resemblance. Unless the assumed period exists, the two halves of the data are entirely independent, when there are enough cycles to eliminate residuals of other periods that might exist. A very simple test for a real relationship between the two curves may be made as follows: There is an even chance that if the results are purely accidental, any pair of values from the same phase in the two curves will lie on the same side of the normal. If there are three curves, one-fourth of them should show all three curves on the same side. Much departure from this accidental grouping indicates strongly a correlation.

(*b*) Having obtained the phase values, as above, for each half of the data, we may consider half the difference of identical phases in the first and last halves of our data as a measure of the deviation of the two curves from each other and of the amount of chance error left in each phase. Call this half difference d. We will have in this example $d_1, d_2, \ldots d_{15}$. The probable error of any point on the curve which is formed from the whole of the data will be given by the formula,

$$\epsilon = 0.6745 \sqrt{\frac{\Sigma(d^2)}{n\text{-}1}}.$$

If this probable error is as large as half the variation from maximum to minimum phase there is approximately an even chance that the variation is accidental. If the ratio of ϵ to the variation is smaller than about one-eighth, the chances are less than one in a thousand that it is accidental. These ratios are tabulated in the general discussion of results for each set of data. Both these criteria must be applied in any case under discussion.

Let us suppose that the assumed period is not an exact number of months; for example, 14⅔ months. In this case 7 cycles will equal 104 instead of 105 months. We must spread our 104 months over 7 cycles of 15 phases each; that is, over 105 phases. To do this we will fill each of the first 6 cycles and the first 14 phases of the seventh cycle just as formerly, using all the data that we have for 7

cycles. We will then use the month's data which we used for the fourteenth phase of the seventh cycle again in the fifteenth phase. Doing this, no month will fall more than a half phase from the proper one as determined by the mean of all positions. If we assume a period of 15½ months we will merely skip one of the month's data, or better still, average it with the next following one. In this manner any period may be plotted with any number of phases desired, and no month's data more than a half phase from its proper place.

FIRST APPLICATION OF THIS METHOD TO RAINFALL.

One-ninth of the mean sun-spot period is very nearly 14⅔ months. I tabulated all the rainfall data from Lawrence, Kan., beginning with 1868, according to the method outlined above. The result showed a variation of about 12 per cent each side of the normal. Next I divided the data into halves and found the two to agree fairly well. Following this I examined data from all of Kansas, from Nebraska, New England and Ohio. The data from Ohio checked fairly well; those from New England and Nebraska gave results which were discordant with themselves. The variation of the sun-spot period now came to mind. If there were any real variations due to sun-spots or to a common cause they would certainly have to keep a constant relationship with the phases of the sun-spot period.

Table 1 shows the dates of maxima and minima of sun-spots as determined by Wolf and Wolfer (7). It also shows the number of years intervening between successive maxima or minima; in other words, the actual sun-spot periods during those years. As a first approximation to keeping the phases in step with the sun spots, I plotted the rainfall between the dates of each pair of consecutive minima on a period one-ninth that interval. Minima occurred in 1889, August, and in 1901, September. The interval is 145 months. I therefore used a period of 16⅙ months between those dates. The next minimum occurred in 1913, May. This interval is 141 months, and I used a period of 15⅔ between these dates. When this was done I secured very much better results than before, so much better that I could not believe them due to accident. I obtained similar curves for each state the whole length of the Atlantic and Gulf coasts as far as Texas. When the data of New England and Pennsylvania were divided in halves, curves of similar shape were obtained for each, differing only in phase. This improvement over the results from a constant period indicated that a more rigid method of keeping constant relationship with the sun-spot phases should be devised before definite conclusions were drawn.

RIGID FOLLOWING OF THE SUN-SPOT PHASES.

It is evident that the sun-spot period between the minima named above had values of 145 and 141 months, respectively. Let us examine the two maxima occurring between these dates. One occurred in 1894, February, and the other in 1906, May, with an interval of 147 months. This must have been the average value of the sun-spot period between these dates. It is longer than the period obtained from either pair of minima named above, yet it occurs as part of each of them and contains no part that is not in one or the other of them. We are forced, therefore, to the conclusion that if continuous (8*a*)—

The length of the sun-spot period is continuously varying and a value of the period obtained between successive maxima or successive minima is merely an average of all values passed through in this interval.

If we had a curve with time plotted along the axis of abscissæ and the corresponding values of the sun-spot period as ordinates, the average value of the sun-spot period between two maxima or two minima occurring at t_1 and t_2 would be given by—

$$t_1 - t_2 = \text{average value} = \int_{t_1}^{t_2} \frac{\text{curve}}{t_1 - t_2} .$$

If we plotted abscissæ and ordinates on the same scale, these average values would form squares bounded by ordinates through the dates which limit them. The area between the axis of abscissæ and the unknown curve, described above, representing the actual value of the period at all times, would in the interval between two maxima or two minima have to equal the corresponding known square. Since these squares overlap, we know the value of a series of overlapping definite integrals of the unknown curve. From these data it is possible, assuming the simplest curve to be the true one, by the aid of a planimeter, to construct the curve without knowledge of its mathematical form. In doing this it is easier to choose some convenient period as the axis of abscissæ and to measure departures from this period. Changing the axis in this way merely changes all the integrals by a known constant amount and changes the known squares into known rectangles. It is also practical to magnify the scale of ordinates very much over the scale of abscissæ. Locating the curve consists first in measuring the area of each of the rectangles; then penciling in what appears to be the curve, measuring the definite integrals of the approximate curve with the planimeter; erasing for a new approximation, and repeating many

times. In the curve of the sun-spot values reproduced as Figure 1, I have erased each part of the curve probably a hundred times. Although very laborious, the process, with enough patience, yields very good results. The accuracy of the period curve depends upon the accuracy with which the epochs of maxima and minima are obtained. A steep but narrow peak, such as that of 1861, may be unreal for this reason. However, due to the short duration of such a peak and the fact that it must almost immediately be counterbalanced, there will usually be little effect in data extending over a long range.

In the preceding paragraph I have spoken of the sun-spot period at any date as a varying quantity, not even approximately constant through a single cycle. This may necessitate a definition of "period" somewhat different from what is ordinarily understood. I therefore give the following definition, which will be adhered to whether referring to sun spots or rainfall.

The length of the period at any date is the reciprocal of the rate of change of phase at that date and need not continue even approximately through a complete cycle.

From this curve I have taken the mean value of the sun-spot period for each year. These values are given as column 2 of table 2. Column 3 gives the departures from 15 months of one-ninth these values. Obviously, 15 months was chosen because it is the nearest integral number of months to one-ninth of a period. If, for example, the number given for any year in column 3 were + 9, it would mean that during that year one-ninth of the sun-spot period was 16 months. If it were — 9 it would mean that the period was 14 months. In the first case it would be necessary, working on a 15-phase basis, to skip a month every 16 months as long as that length of period persisted; in the second case to repeat one every 14 months. We can thus construct a table of months to be repeated in the analysis of our rainfall data when the ninth of the sun-spot period is less than 15 months, or to be skipped (or better still, averaged with the next adjacent one) when the ninth is more than 15, in order that Wolfer's sun-spot maxima may all fall in one phase and his sun-spot minima in one.

In this work I have in each case averaged the month to be skipped with the next following one instead of actually skipping. Thus three months' data give two phases, the result desired through skipping, and all data are used. There is, however, such a slight gain in accuracy that I scarcely believe it worth the slight extra work involved. If this averaging and repeating is done correctly the epoch

of maximum of each of the cycles of the sun spots will always fall in one phase of the suspected rainfall variation and also each minimum in one. Wolfer's values of maxima and minima are uncertain by a month or so, and therefore in the first paper the placing of them within one phase from the mean was considered as a perfect check in determining the months to be averaged or repeated. When there was a greater error than this in determining the position of a maximum or a minimum it meant that there was a slight error in the curve and that it was necessary to apply a slight adjustment factor to the values of the period taken from it. In no case did I have a large factor to apply, thereby showing that the curve as constructed was approximately correct. Indications from the work explained above were that the period taken from it could be relied upon to within three or four months, and that such errors as did occur were canceled in most cases by ones of opposite sign before adjustment had become serious.

I did not realize at the time that readers might think this discrepancy purposely made by me in order to better my results. To avoid this objection I have, in this paper, made the Wolf-Wolfer epochs fall exactly in the same phase each cycle. The phase in which the sun-spot maximum falls has been numbered 1 and that in which minimum falls 8. For 1913 Wolfer has published two dates of sun-spot minimum, first May, and later August. I used the former in the first paper before seeing his later work. The sun-spot curve seems to me to indicate May, or even an earlier epoch, correct. Wolfer's later epoch may, therefore, be a typographical error, and I have continued to use May. Since a short period locates its epochs of maxima and minima more exactly than a long one, it will be possible later, if the existence of the short rainfall period be admitted, to revise the Wolf-Wolfer epochs from the rainfall data. Such a gain in accuracy would mean much in an investigation of the sun-spot periodicity.

Table 3 shows which months I have averaged and repeated in the analysis of the rainfall data of each country investigated. It is probably useless to emphasize that there was no change in this table for any of the countries under consideration. At first thought the results of table 3 and of figure 1 are startling. However, an inspection of the much greater changes in the period which have persisted through entire cycles during the last 115 years, namely, from 88 to 205 months, shows that these variations through short periods of time are to be expected. Moreover, there is no way to draw a curve

satisfying the necessary conditions and having smaller variations, unless possibly by introducing more points of maxima and minima upon it. Such a complication would be much less probable than the variations shown by the present one, all of which are less than the variations from the mean value of complete cycles of approximately 11 years have been in the rather recent past, as shown by table 1.

THE RAINFALL DATA EXAMINED.

I have examined the rainfall averages of each of the forty-two sections in which the United States has been divided by the Weather Bureau, of a number of stations in Central Siberia, of the Punjab in India, of a few towns in Chile, of complete records of Denmark and Sweden and stations in Holland and England, of South Australia, of Jamaica, and of Tananarive, Madagascar. I had a small amount of data from the Soudan and Abyssinia and scattered small amounts from other countries, but none of these enough to examine with any weight. There were also data such as received from Canada, where the proximity of countries for which I had data made it seem unwise to take the great amount of time necessary to average the individual stations, and where, unlike Madagascar, thousands of miles from the nearest data used, it seemed useless to obtain results with the little weight that would be attached to one station.

The results from each of the sections named above are discussed here, the tables are given from which these results are deduced, the values are given for each individual cycle, and the means of the halves or thirds are given and plotted, as also the curves from the whole data. The sections are grouped in three main divisions:

(A) Interiors and eastern coasts of large continents. There are three such sections: Eastern United States, Central Siberia, and the Punjab.

(B) Western coasts of continents. This group includes the Pacific coast of the United States, the group of countries from the northwest European coast, and a very small amount of data from Chile.

(C) Other sections. This includes South Australia, Jamaica and Tananarive, Madagascar.

The last sun-spot maximum occurred in 1917, and all data since then are thus unavailable for use in examining the existence of the period. This would not be a serious handicap for predicting, if the period should be proved to exist, since the course of the maxima and minima could be followed from cycle to cycle by using means from

a large number of sections and an extrapolation made for a cycle in advance without serious error. Indeed, in such a case it might be possible to predict the time of the next sun-spot maximum or minimum quite accurately from the rainfall data.

Effect of Annual Cycle. In many cases the residual left from the seasonal variation is large enough to distort the curves materially. I have, therefore, always carefully eliminated it, no matter how large or how small. To do this I have, wherever it is very pronounced, prepared two tables for each section according to the plan previously outlined, repeating and averaging in each one the months determined by table 3. In the first of these tables I have used the actual values of the rainfall. In the second I have used instead of each January the mean of all the Januaries, and so on for each month of the year. In this second table the mean monthly values were repeated or averaged exactly as in the first one, to give a table entirely similar to the first table. The variation from phase to phase in this second table is, therefore, entirely the seasonal residual and contains all of it. For the average state in the United States it is approximately four per cent each side of the normal, the rest of the seasonal variation having been damped out by the process of tabulating the incommensurable period which is being investigated. The quotients of the sums of each phase of the first table by the second give us the percentage of normal rainfall of that phase for the section concerned throughout all the years of the data. Each month is in this way weighted in accordance with its normal rainfall. In no case has there been any smoothing of results other than that marked in the tables where the *mean* has sometimes been smoothed by averaging each phase with the ones immediately adjoining for better examination.

In the eastern United States and northern Europe the yearly variation of rainfall is small enough that each month may be weighted the same without serious error. I have, therefore, in these two cases divided the actual rainfall of each month by its normal and thus obtained the percentage of normal to plot. This has the advantage for the reader that he need look at but one table instead of two to see how the period has been followed from cycle to cycle.

It may occur to some that possibly there is in some manner a residual of the seasonal effect left in this period, despite the elimination explained above. There are three answers that may be givn to this objection, all of which are merely the same one in different forms.

(*a*) In Professor Schuster's discussion of the periodogram (6) method of searching for periods we find the following: "There is a limit beyond which it is useless to go. This limit is reached when the values of A and B for two closely adjoining values n_1 and n_2 are no longer independent of each other. The theory of vibration shows that independence begins when there is an ultimate disagreement of phase amounting to about one-quarter of a period."

(*b*) Professor Turner has worked out the effects of any period on adjoining periods (8*b*). He divides the data into integral parts and calls any one of these submultiples q; p is a period near q, such that $q+x=p.x<1$. From the Fourier sequence the periods q and $q+1$ are independent. Let us consider the seasonal period as q and the ninth harmonic of the sun-spot period as p. In order that x may be as small as 1, we must have $q=3$. That x be less, requires $q=2$. But, quoting Professor Turner, "q is a fairly large integer for any periodicity worth serious consideration."

(*c*) The work involved in computing the periods near 12 months for each state is much greater than the value of the results. I have, however, taken Pennsylvania as typical of the United States and computed periods of 12, 13, 14, 15 and 16 months.

For 12 months, which is the seasonal period, the amplitude of the variation is 34 per cent; for 13 months it is 11 per cent; for 14 months it is 12 per cent; for 15 months it is 10 per cent; and for 16 months it is 17 per cent; the amplitude of the ninth harmonic of the sun-spot period is 26 per cent. The mean value of the ninth harmonic during this interval of years was 15.8 months, showing the increase in amplitude at the nearest of the other periods as demanded by the theory or the periodogram (6) or by the Fourier sequence (8*c*).

A serious source of weakness in the state averages published by the United States Weather Bureau and by almost every other meteorological service developed during this investigation. This may well be illustrated by the state of Washington as a fair sample. Within one year the number of stations used in the state average varied between 105 and 130. Over a number of years the range is larger. The eastern part of the state is very much drier than the western. If one is comparing two months' rainfall it becomes imperative that he know what stations were omitted each month. The month showing the greater fall may be below normal and that showing less may be above because of omission of eastern stations in the first and western in the latter. I realize that it is impossible to ob-

tain a perfectly homogeneous record, since volunteer observers must sometimes fail, often through no fault of their own, but I would venture to suggest a method by which the records may be reduced to a near homogeneity. The sum of the actual rainfall for all the stations used may be divided by the sum of the normals of the several stations and the quotient published as the percentage of normal which fell that month. The means of the normals of stations chosen for accuracy of records and geographical distribution may then well be taken as the normal of the state, and when multiplied by this quotient will give a weighted mean of the state that will be practically homogeneous from year to year. This lack of homogeneity in state records is much more serious in investigation of long periodicities such as the Brückner and eleven-year cycles, and might easily show entirely negative results where the period actually exists. An example of the reduction of scattered material to homogeneity is given in this paper in the treatment of Chile, where long records are available from five towns with widely differing normals. These records begin in different years and omit certain years irregularly. The sums of the actual rainfall given were tabulated for the fifteen-month periodicity, as were also the sums of the normals for each month that a station was used. These sums were then added through each half of the data for each phase, and the quotient of actual by normal was taken. These tables are Nos. 19 and 20. In the eastern part of the United States the normals from one part of a state to another vary by small enough amounts that the records are not seriously impaired. For the western part I felt it best to take instead the stations on the coast having perfect records extending as far back as 1880. All such were used except where stations in California happened to be very close together, in which cases one was always omitted in order not to give that small section of the coast undue weight. Nineteen such stations in California and western Oregon were available. No station in Washington had such a long record without break. This procedure also has the advantage of almost doubling the length of record over the published state averages. The results from these stations are shown as tables 10 to 12. The names of the stations will be found at the heads of these tables. The Adelaide Observatory in South Australia seems to have kept the most ideal record from 1861 to 1907. They averaged the same fifty towns, apparently, from the beginning to the end of that period. Unfortunately, this method was discontinued and the present one of averaging all available stations, as in the United

States, instituted. The great shift in normal made it impossible to compare the early and the later records. This investigation of Australian rainfall ends, therefore, with 1907, although the later results kindly sent by the meteorological director of the commonwealth are published here for information:

GROUP A.

	Eastern United States.	Siberia.	The Punjab, India (smoothed).
ϵ	2.7	2.4	3.6
Range of curve from whole data	23	17	29
Ratio	0.117	0.141	0.138
Number phases on one side of normal	12	10	*9 8

The ratios in each of these cases are approximately one-eighth, showing, as previously developed, a very small chance of such accidental agreement. In the case of India the same ϵ was derived from the relationship of both the first and last of its three curves to the middle one. Since the ratio given measures the possibility of chance agreement of either of these curves with the middle one, the chance that both agree in this manner by accident is only the square of the chance that one does.

GROUP B.

	Pacific coast (smoothed).	Northern Europe.	Chile.
ϵ	3.8	2.5	3.9
Range	43	22	25
Ratio	0.088	0.114	0.156
Number of phases on one side of normal	*11 12	12	10

As would be expected from an examination of the curves, the chance of mere accidental agreement between the two halves of the Pacific coast and northern European curves is negligible. In the case of Chile, just as one would judge from the appearance of the curves, it is much larger than for the other two, but is still small.

GROUP C.

	South Australia.	Jamaica.	Madagascar (smoothed).
ϵ	4.6	3.5	5.1
Range	24	19	28
Ratio	0.193	0.184	0.182
Number of phases on one side of normal	8	10	8

The results of group C, while favoring the true existence of the periodicity to some extent, do not show the certainty of groups A and B. This is to be expected in the case of Jamaica, which is a

* Unsmoothed.

small, mountainous island, where, as Professor Pickering says, "The rainfall is very unequal in different portions of the island." It varies from 33 inches west of the mountains to 248 on the eastern end of the island. For Madagascar there is but one station, with a record over only 21 cycles, so that the correlation is all that one could expect. In the case of South Australia, however, we have a long, homogeneous record from fifty stations. The effect of the period is evidently much less certain there than in the region of groups A and B. In this it reminds one of the results obtained from the central third of the United States, a region located between the two types represented by groups A and B. Data are not at hand to show whether such a reversal, as in the United States, would be found between the northern and southern parts of South Australia. An investigation of this character would, I venture to predict, show the reversal. I hope to secure data to examine this region more thoroughly.

GENERAL DISCUSSION.

In group A, which consists of interiors or eastern coasts of large continents, we find *the minimum of our curves coming exactly at phase 1 in each case. This is the phase, as told above, which every ninth cycle contains the sun-spot maximum.* Each of these curves shows also the effect of a second harmonic of this period with one minimum at this same phase, the other neutralizing the maximum, which would normally fall at phase 8. This much can safely be accepted as true features of purely continental curves.

In group B we find more variation in curves from one section to another. For the Pacific coast we find the minimum at phase 7 and the maximum at phase 13; for northern Europe the minimum at 7, if we smooth our curve, and the maximum at 14. The small amount of data from Chile does not give any very definite results, almost equal minima at 2 and 12, with maxima at 10 and 14. The marine type seems, then, with considerable uncertainty, to give a minimum of rainfall at time of sun-spot minimum and a maximum shortly before the sun-spot maximum.

The halves or thirds of the curves at any one place will differ from each other for one or more, probably all, of the following reasons:

(*a*) Accidental errors and other periodicities are not entirely damped out.

(*b*) The epochs of sun-spot maxima and minima are uncertain, and consequently some data are incorrectly placed by one or more

phases. If this periodicity is generally accepted, the recent sun-spot epochs can be revised to give the best rainfall results, since the short period and the great amount of data will locate them more accurately than the sun-spot counts themselves.

(*c*) The curve probably actually undergoes changes, similar in shape and magnitude to those of the sun spots, one maximum of which will be several times higher than another. This is indicated directly by the persistency with which a phase for quite a number of consecutive cycles will often differ from its mean by fairly large amounts.

(*d*) If the rainfall is not a *pure continental* or *pure marine* type, we will have one type often prevailing, although in the long run the other dominates.

Although I have examined this period as though it varied in length, I do not desire to stand in the least committed to an actual variation. This period, the eleven-year period and the Brückner are all harmonics. When examined by itself each is found to be variable. However, it is quite possible that their variations and that of the sun-spot period are only apparent, being caused by the superposition of a number of constant periodicities. Regardless of this constancy, I believe these three periods not to be separate, but merely terms in an irregular, long-period rainfall variation. It is very important that a search be made very carefully to determine what other terms there may be of such large magnitude as these.

If the relationship between sun spots and rainfall were a direct one, the eleven-year period would certainly far overshadow both this and the Brückner. Instead, its magnitude seems usually to be less than either. The search for a thirty-three-year period in sun spots has been inconclusive, although analysis shows a very strong sun-spot variation of twice this length. The relationship of the Brückner cycle to the sun-spot period stands out vividly, however, if we look for its epochs in long, homogeneous records from which the eleven-year period has been eliminated by averaging between consecutive sun-spot maxima or minima. In concluding, I desire to quote from Pickering's statement, at the close of his article mentioned above, as most nearly expressing my own opinion on this relationship:

"I do not believe that the sun spots themselves, or their absence, cause the droughts. The spots are merely a surface indication of an overturn of material and temperature occurring beneath the solar surface in connection with magnetic storms. . . . I have only to derive statistics from observed rainfall data to show the coincidence."

I wish to acknowledge the assistance of the research committee.

of the Graduate School, whose grants for computers have been a very important factor in the prosecution of the work. Mr. Anthony Oates was engaged as computer for the earlier stages of the work and Miss Nellie Lynn for the later. Prof. F. E. Kester has devoted a great deal of time to discussing each phase of the problem, and to his suggestions is due much of the success. Prof. C. F. Talman has loaned me many books from the library of the United States Weather Bureau. Mr. S. D. Flora has thrown open to me all the records in the state meteorological office at Topeka. Prof. Carl Ryder has sent me a great deal of manuscript matter, which has been extremely valuable. The Governor General of Madagascar sent manuscript tables of rainfall and temperature at Tananarive. The Egyptian government sent valuable manuscript records of Soudan and Abyssinia, which unfortunately do not extend back far enough for present uses. Supplemented by the next ten years' records, they will be very valuable. Meteorologists of several other countries have sent all available printed records. To all these I owe my most sincere thanks.

BIBLIOGRAPHY.

1a. Douglass, A. E.: The Correlation of Sun Spots, Weather, and Tree Growth. Pub. American Astronomical Soc., 1918, vol. III, p. 121.

1b. Douglass, A. E.: Climatic Cycles and Tree Growth. Carnegie Institution of Wash., 1919. The author seems to have proved definitely a correlation between climate and sun spots. Nothing on this subject that has yet come to my attention begins to compare in importance with this work.

2. Hann, J.: Sun Spots and Rainfall. Handbook of Climatology (trans. by R. DeC. Ward), vol. I, p. 406. *Brückner:* Klimaschwankungenseit, 1700 (Vienna, 1890). Has shown a varying period of about thirty-five years in rainfall and temperature. *Lockyer:* The Solar Activity, 1833-1900. Proc. Roy. Soc., vol. 68, p. 285. Showed a possible correlation of this period with sun spots. *Clough, H. W.:* Synchronous Variations in Solar and Terrestrial Phenomena. Astrophys. Jour., vol. 22, p. 42. Has greatly strengthened the evidence of such a relationship. They have also considered the variation in length of the sun-spot period. Clough says: "The solar-spot activity is periodically accelerated and retarded, and this action is primarily manifest in the varying length of the eleven-year spot cycle, since it operates continuously throughout the entire interval to accelerate or retard the occurrence of the two phases." (Loc. cit., p. 59.)

3. Turner, H. H.: A Fifteen-month Period in Earthquakes. Monthly Notices, Roy. Astronomical Soc., April, 1919, p. 461.

4a. Alter, Dinsmore: Possible Connection Between Sun Spots and Earthquakes. Science, May 14, 1922, p. 486.

4b. Alter, Dinsmore: A Possible Rainfall Period Equal to One-ninth the Sun-spot Period. Monthly Weather Review, Feb., 1921. Continuation of Investigation of a Possible Rainfall Period Equal to One-ninth the Sun-spot Period, and Application of Marvin's Periodocrite to Rainfall Periodicity. Kansas University Science Bulletin, vol. XIII, Nos. 8 and 9.

5. Marvin, C. F.: Discussion of Rainfall Periodicity. Monthly Weather Review, Feb., 1921.

6. Schuster, Arthur: On the Periodicities of Sun Spots. Phil. Trans. 206a (1906), p. 71.

7. Wolfer, A.: Revision of Wolf's Sun-spot Relative Numbers. Monthly Weather Review, April, 1902, pp. 171-176. Tables of Sun-spot Frequencies, *ibid,* July, 1915. Tables of Sun-spot Frequency for the Years 1902-1919, *ibid,* Aug., 1920, p. 459.

8a. Turner, H. H.: On a Simple Method of Detecting Discontinuities in a Series of Recorded Observations, With an Application to Sun Spots. Suggesting that they are caused by a meteor swarm due to successive encounters of the Leonids with Saturn, which has been more than once perturbed by the Leonid swarm., Monthly Notices Royal Astronomical Society, 1914, pp. 82-109.

8b. Turner, H. H.: Sun-spot Periodicity as a Fourier Series. *Ibid,* 1913, pp. 714-732, especially p. 717.

8c. Turner, H. H.: Further Remarks on the Expression of Sun-spot Periodicity as a Fourier Sequence. *Ibid,* 1914, pp. 16-26.

9. Sources of Material:

(a) Climatological Data of the United States.

(b) Fundamental Data of Siberian Climate. Title and name of author in Russian.

(c) Eliot: The Rainfall of India, 1901. India Monthly Weather Review.

(d) British Rainfall, 1919. Observations Meteorologiques Suedoises, published by L'Academie Royale des Sciences de Suede, 1910.
Hartman: Het klimaat van Nederland, 1913.
Rainfall tables of Denmark, sent by Professor Carl Ryder in manuscript form.

(e) Recopilacion de sumas de aqua caida en Chile, 1849-1915, and annual volumes following.

(f) Meteorological Observations of the Adelaide Observatory, 1907.

(g) Pickering: The Relation of Prolonged Tropical Droughts to Sun Spots. Monthly Weather Review, Oct., 1920.

(h) Manuscripts sent by the Governor General of Madagascar.

TABLE 1.—Wolf's & Wolfer's table of sunspot maxima and minima. (Copied from *Monthly Weather Review*, August, 1920.)

Minima.			Maxima.		
Epochs.	Weights.	Periods.	Epochs.	Weights.	Periods.
1610.8	5	.....	1615.5	2	.....
1619.0	1	8.2	1626.0	5	10.5
1634.0	2	15.0	1639.5	2	13.5
1645.0	5	11.0	1649.0	1	9.5
1655.0	1	10.0	1660.0	1	11.0
1666.0	2	11.0	1675.0	2	15.0
1679.5	2	13.5	1685.0	2	10.0
1689.5	2	10.0	1693.0	1	8.0
1698.0	1	8.5	1705.5	4	12.5
1712.0	3	14.0	1718.2	6	12.7
1723.5	2	11.5	1727.5	4	9.3
1734.0	2	10.5	1738.7	2	11.2
1745.0	2	11.0	1750.3	7	11.6
1755.2	9	10.2	1761.5	7	11.2
1766.5	5	11.3	1769.7	8	8.2
1775.5	7	9.0	1778.4	5	8.7
1784.7	4	9.2	1788.1	4	9.7
1798.3	9	13.6	1805.2	5	17.1
1810.6	8	12.3	1816.4	8	11.2
1823.3	10	12.7	1829.9	10	13.5
1833.9	10	10.6	1837.2	10	7.3
1843.5	10	9.6	1848.1	10	10.9
1856.0	10	12.5	1860.1	10	12.0
1867.2	10	11.2	1870.6	10	10.5
1878.9	10	11.7	1883.9	10	13.3
1889.6	10	10.7	1894.1	10	10.2
1901.7	10	12.1	1906.4	10	12.3
1913.4*	10	11.7	1917.6	10	11.2

* See text.

TABLE 2.

Year.	Period.	Departure.	Year.	Period.	Departure.	Year.	Period.	Departure.
	Months.			*Months.*			*Months.*	
1850	180	+45	1871	106	—29	1892	144	+ 9
51	176	+41	72	135	0	93	145	+10
52	165	+30	73	156	+21	94	146	+11
53	146	+11	74	170	+35	95	147	+12
54	125	—10	75	180	+45	96	148	+13
55	100	—35	76	184	+49	97	149	+14
56	90	—45	77	184	+49	98	149	+14
57	93	—42	78	184	+49	99	149	+14
58	125	—10	79	181	+46	1900	149	+14
59	174	+39	1880	173	+38	01	149	+14
1860	196	+61	81	161	+26	02	148	+13
61	196	+61	82	144	+ 9	03	147	+12
62	173	+38	83	113	—22	04	146	+11
63	143	+ 8	84	102	—33	05	144	+ 9
64	104	—31	85	100	—35	06	142	+ 7
65	97	—38	86	100	—35	07	140	+ 5
66	94	—41	87	101	—34	08	138	+ 3
67	93	—42	88	108	—27	09	137	+ 2
68	93	—42	89	128	— 7	1910	136	+ 1
69	94	—41	1890	138	+ 3	11	136	+ 1
1870	96	—39	91	142	+ 7	12	135	0

TABLE 3.—Data repeated or averaged in keeping rainfall periodicity in step with sun spots.

Skipped or averaged.	Repeated.	Skipped or averaged.
1861.....Mar., Sept. 1862.....June. 1863.....June.	1865.....July. 1866.....July. 1867.....Mar., June, Sept., Dec. 1868.....Jan., Apr., Jun., Aug., Nov. 1869.....Feb., June, Oct. 1870.....April, Oct. 1871.....April.	1872.....April. 1873.....Sept. 1874.....April, Sept. 1875.....Mar., June, Nov. 1876.....Feb., May, Aug., Nov. 1877.....Jan., Apr., Jul., Sept., Dec. 1878.....Mar., June, Aug., Nov. 1879.....Mar., July, Nov. 1880.....April, Oct. 1881.....July. 1883.....Mar.
Repeated.	**Skipped or averaged.**	**Repeated.**
1884.....Jan., Sept. 1885.....April, Oct. 1886.....Jan., May, Sept. 1887.....Jan., May, Sept. 1888.....Jan., May, Sept. 1889.....Feb.	1891.....Jan. 1894.....May. 1895.....Jan. Sept. 1896.....April. 1897.....Mar. 1898.....Jan., Dec. 1899.....Dec. 1901.....Jan., Nov. 1902.....June. 1903.....Sept. 1909.....July. 1913.....Jan.	1915.....Jan. 1917.....July.

TABLE 4.—Eastern United States. Table of observed per cent of normal of 26 states, comprising 20 meteorological districts.

Years.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1878	57	103	89	128	132	82	82	125	64	162	67	117
79	63	73	75	62	59	102	100	123	45	83	171	133
1880	131	120	92	117	131	98	85	113	100	98	93	73
81	58	208	129	77	58	172	73	31	118	277	180	147
82	94	214	148	115	165	200	98	115	57	162	105	108
83	74	258	64	129	127	122	110	71	36	218	149	116
84	94	184	117	89	99	121	117	60	109	103	60	170
85	127	68	28	93	89	102	84	138	96	145	108	80
86	115	87	102	90	120	89	73	96	102	56	146	86
87	91	158	69	91	79	82	93	93	73	113	80	131
88	110	89	131	64	124	87	77	134	135	132	130	85
89	114	71	61	73	103	123	138	68	117	76	163	64
1890	121	138	130	97	132	99	84	124	144	152	62	86
91	129	149	71	129	59	98	106	119	56	66	136	96
92	127	78	90	113	124	132	104	97	90	36	117	77
93	99	137	76	131	134	98	69	99	104	119	101	88
94	83	116	71	80	113	69	78	85	126	101	71	95
95	135	50	81	112	87	83	95	90	54	65	116	113
96	66	121	101	62	88	114	134	76	123	75	139	49
97	90	125	135	110	87	86	122	82	63	68	129	112
98	128	69	110	96	92	87	108	142	102	168	136	81
99	112	125	131	63	80	80	96	83	94	74	70	93
1900	86	114	100	107	84	104	99	77	83	116	139	82
01	79	74	105	131	120	93	88	149	106	59	59	156
02	71	103	117	77	75	120	92	74	137	120	112	140
03	95	162	130	97	86	126	97	111	65	103	69	77
04	95	73	109	83	82	88	101	111	89	54	62	97
05	90	94	86	101	115	107	116	117	98	116	73	129
06	106	60	126	63	92	114	126	121	126	124	92	110
07	102	66	79	113	134	107	98	88	145	85	145	127
08	90	136	99	116	134	79	97	105	65	70	61	90
09	78	141	97	137	117	125	90	84	93	71	67	100
1910	105	105	45	104	102	121	99	80	83	125	72	77
11	89	68	69	130	56	94	79	138	111	142	133	136
12	93	88	146	148	116	93	105	103	125	79	79	106
13	145	83	159	95	94	70	89	78	123	140	87	76
14	79	97	82	108	56	73	85	67	74	104	91	130
15	145	102	53	43	130	94	114	145	101	122	96	112
16	113	81	76	78	112	125	138	80	90	87	74	100
17	108	72	126	100	86	110	102	100	96	120	31	55
18	118	60	72	146	95	87	77	88	115	150	99	125
19	93	89	115	91	145	100	114	109	66	186	128	86

TABLE 5.—Eastern United States, beginning January, 1887. Observed percentages of normal.

Cycles.	Phase numbers.														
	(15)	(1)	(2)	(3)	(4)	(5)	(6)	7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
1	91	91	158	69	91	79	79	82	93	93	73	73	113	80	131
2	110	110	89	131	64	124	124	87	77	134	135	135	132	130	85
3	114	71	71	61	73	103	123	138	(68)	117	76	163	64	121	138
4	130	97	132	99	84	124	144	152	62	108	149	71	129	59	98
5	106	119	56	66	136	96	127	78	90	113	124	132	104	97	90
6	36	117	77	99	137	76	131	134	98	69	99	104	119	101	88
7	83	(116)	71	96	69	78	85	126	101	71	115	50	81	112	87
8	83	95	72	65	116	113	66	121	82	88	114	134	76	123	75
9	139	49	90	130	110	87	86	122	82	63	68	129	120	69	110
10	96	92	87	108	142	102	168	108	112	125	131	63	80	80	96
11	83	94	74	82	86	114	100	107	84	104	99	77	83	116	139
12	80	74	105	131	120	93	88	149	(106)	59	156	71	103	117	75
13	98	92	74	137	120	112	140	95	162	130	97	86	126	97	88
14	103	69	77	95	73	109	83	82	88	101	101	89	54	62	97
15	90	94	86	101	115	107	116	117	98	116	73	129	106	60	126
16	63	(92)	114	126	121	126	124	92	110	102	66	79	113	134	107
17	98	88	145	85	145	127	90	136	99	116	134	79	97	105	65
18	70	61	90	78	141	97	137	117	125	90	84	93	71	67	100
19	105	105	45	104	102	121	99	80	83	125	72	77	89	68	69
20	130	56	94	79	138	111	142	133	114	88	146	148	116	93	105
21	103	125	79	79	126	83	159	95	(94)	70	89	73	123	140	87
22	76	79	97	82	108	56	73	85	67	74	104	91	130	145	145
23	102	53	43	130	94	114	145	101	122	96	112	113	81	76	78
24	112	125	138	80	90	87	74	100	108	72	126	100	86	110	102
Mean, 1-12,	96	94	90	95	102	99	110	117	88	95	112	100	100	100	101
Mean, 13-24,	96	87	90	98	114	104	115	103	106	98	100	97	99	96	97
Mean of all	96	90	90	96	108	102	113	110	97	97	106	98	100	98	99

TABLE 6.—Central Siberia. Table of observed percentages of normal.

Years.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1838	13	50	21	82	54	87	95	118	101	62	79	18
39	8	41	57	128	150	118	55	129	117	203	162	119
40	3	42	127	126	160	103	146	63	120	79	46	17
41	41	4	47	76	185	150	106	43	134	201	40	28
42	21	31	4	31	80	92	155	129	188	50	50	27
43	36	16	26	35	73	234	99	129	46	90	89	22
44	19	83	123	74	60	114	110	201	130	40	118	73
45	68	2	65	81	103	89	147	79	97	17	10	45
46	0	63	84	220	108	146	118	151	5	104	140	222
47	33	43	106	43	35	230	183	119	156	19	49	36
48	133	6	66	39	62	76	96	106	168	144	23	39
49	72	15	43	44	73	73	108	164	165	82	34	7
1850	43	31	52	85	24	108	57	90	48	56	16	97
51	106	58	91	138	104	22	81	117	111	132	139	28
52	33	151	162	32	145	98	64	56	91	95	112	35
53	21	27	95	145	61	74	59	72	58	111	91	62
54	162	18	84	37	118	75	58	197	121	42	47	64
55	16	60	132	49	99	37	43	36	5	36	91	77
56	38	51	69	111	195	148	115	71	177	94	75	134
57	5	72	61	97	58	70	96	33	71	98	122	71
58	60	115	11	96	69	68	40	79	52	53	79	54
59	15	134	55	60	72	120	95	43	137	26	82	32
1860	27	29	54	72	27	51	39	52	50	45	38	33
61	29	36	41	34	86	89	49	94	101	65	126	24
62	20	39	18	74	64	98	56	31	70	26	11	18
63	48	12	79	2	18	91	111	40	121	40	30	11
64	48	38	61	46	59	57	52	121	91	29	50	36
65	56	36	20	66	43	22	95	50	53	58	87	72
66	44	43	94	12	87	26	31	170	182	57	12	28
67	121	45	165	42	10	54	35	106	90	65	13	69
68	88	23	55	43	31	127	114	102	113	19	61	86
69	39	40	51	42	25	112	140	70	53	25	53	38
1870	55	34	61	63	98	25	120	162	61	43	99	91
71	52	56	29	76	66	93	86	106	70	38	72	89
72	24	85	67	68	102	69	142	123	91	85	100	95
73	43	70	86	74	118	38	52	81	121	96	10	133
74	125	65	122	171	43	57	45	110	75	115	108	81
75	112	85	141	93	99	86	63	101	90	91	63	132
76	70	116	101	145	87	119	105	119	63	96	78	140
77	86	112	90	124	49	66	120	66	86	58	57	41
78	48	57	16	58	106	148	72	68	122	120	153	79
79	77	126	24	89	127	92	92	163	129	86	96	113
1880	47	88	138	41	70	128	79	147	110	148	54	35
81	111	83	33	42	128	115	127	80	135	84	101	39
82	129	63	104	66	117	132	139	61	109	83	61	69
83	90	205	46	21	103	116	124	72	72	74	47	98
84	98	91	83	43	46	112	68	118	81	34	31	91
85	86	121	54	76	107	95	114	85	125	183	64	123
86	125	99	105	78	105	64	107	93	85	64	78	99
87	69	108	119	89	125	70	61	112	125	94	121	125
88	63	90	128	117	69	69	74	72	58	84	109	96
89	71	56	123	88	103	93	123	109	61	105	92	77
1890	95	157	105	145	121	105	102	91	109	101	124	109
91	116	69	105	99	132	134	78	68	117	150	120	118
92	97	107	86	92	93	128	82	93	58	77	80	105
93	66	113	115	86	77	134	125	91	74	135	127	116
94	133	123	96	136	145	89	115	136	116	46	117	90
95	129	125	116	167	81	129	77	81	67	132	101	80
96	100	86	47	117	89	98	109	113	106	107	129	86
97	113	84	87	117	128	118	94	116	98	125	83	97
98	123	71	36	117	115	51	61	73	85	104	145	99
99	153	92	107	98	116	109	131	60	60	65	82	67
1900	70	148	84	82	87	45	92	99	108	98	92	78
01	91	81	140	153	75	58	88	123	81	135	138	93
02	222	94	252	90	117	123	93	80	74	140	115	133
03	144	104	100	138	99	89	109	110	145	83	100	139
04	110	286	87	103	100	108	96	131	104	101	95	125
05	116	71	89	93	124	84	83	122	130	154	127	112
06	154	73	134	80	134	160	153	104	101	107	114	144
07	143	89	77	86	110	110	120	130	99	144	111	155
08	105	103	155	72	105	137	115	108	172	54	124	119
09	109	130	134	125	87	51	112	64	147	80	172	98

Three or more stations available beginning April, 1873.

TABLE 7.—Central Siberia. Observed percentages of normal is tabulated beginning April, 1873.

Cycles	Phase numbers.														
	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(1)	(2)	(3)
1.....	74	118	38	52	101	96	110	133	125	65	146	43	57	45	92
2.....	115	108	81	112	113	93	92	63	101	90	77	132	93	101	116
3.....	119	112	63	87	113	112	107	49	93	76	58	49	48	62	58
4.....	127	70	122	136	(79)	77	75	89	127	92	163	129	91	113	47
5.....	88	90	70	128	79	147	129	54	35	111	83	33	42	128	121
6.....	80	135	84	101	39	129	63	104	66	117	132	139	61	109	83
7.....	61	69	90	126	21	103	116	124	72	72	74	47	(98)	98	98
8.....	91	83	43	46	112	68	118	81	81	34	31	91	86	121	54
9.....	76	76	107	95	114	85	125	183	183	64	123	125	125	99	105
10.....	78	105	105	64	107	93	85	85	64	78	99	69	69	108	119
11.....	89	125	125	70	61	112	125	125	94	121	125	63	63	90	128
12.....	117	69	69	69	74	72	58	58	84	109	96	71	56	56	123
13.....	88	103	93	123	(109)	61	105	92	77	95	157	105	145	121	105
14.....	102	91	109	101	124	112	69	105	99	132	134	78	68	117	150
15.....	120	118	97	107	86	92	93	128	82	93	58	77	80	105	66
16.....	113	115	86	77	134	125	91	74	135	127	116	133	(123)	96	140
17.....	89	115	136	116	46	117	110	125	116	167	81	129	77	74	132
18.....	101	80	100	86	82	89	98	109	113	106	107	129	86	113	86
19.....	117	128	118	94	116	98	125	83	110	71	36	117	115	51	61
20.....	73	85	104	122	153	92	107	98	116	109	131	60	60	65	74
21.....	70	148	84	82	87	45	92	99	108	98	97	84	81	140	153
22.....	75	58	88	123	(81)	136	93	222	94	252	90	120	93	80	74
23.....	140	115	133	144	104	100	138	99	89	109	128	83	100	139	110
24.....	286	87	103	100	108	96	131	104	101	95	125	116	71	89	93
25.....	124	84	83	122	130	154	127	112	154	73	134	80	(134)	160	153
26.....	104	101	107	114	144	143	89	77	86	110	116	120	130	99	144
27.....	111	155	105	103	155	72	105	137	115	108	172	54	124	119	109
28.....	130	134	125	87	82	64	147	80	172	98	.....	.....	.....	.....	.....
1=14	102	106	93	102	96	104	105	106	99	97	112	85	85	106	105
15=28	108	99	97	96	100	100	103	100	106	107	102	94	91	94	102
1=28	105	103	95	99	98	102	104	103	102	102	107	90	88	100	104

The means above are adjusted to make their mean values 100.

TABLE 8.—The Punjab, India. Means of 25 towns, 1863 to 1900, and of Punjab meteorological districts, 1901 to 1918. Data in inches and hundredths.

Years.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1863	209	13	116	36	26	415	1413	658	70	179	13	59
64	64	108	48	175	152	97	553	658	190	2	0	57
65	128	322	263	83	49	74	344	782	518	0	7	203
66	178	83	32	72	26	233	765	695	55	20	0	0
67	34	34	87	122	170	79	536	854	162	3	0	52
68	89	188	130	143	48	149	503	253	65	44	0	30
69	139	31	447	13	1	135	766	188	541	56	0	8
1870	6	18	154	39	11	303	322	639	178	16	0	38
71	20	206	5	16	87	499	548	208	115	0	0	93
72	140	70	113	59	93	226	893	671	296	6	0	56
73	44	13	48	2	174	29	855	548	380	69	2	64
74	127	86	129	30	26	342	700	353	240	1	0	3
75	6	151	9	1	90	59	626	943	1080	65	14	46
76	38	44	149	103	85	114	1050	354	201	140	22	1
77	263	312	104	189	112	182	226	67	342	113	138	407
78	75	220	17	202	213	73	624	1011	122	13	0	24
79	4	16	140	3	69	432	344	653	116	60	0	73
1880	21	133	0	7	32	330	828	153	176	0	14	75
81	7	92	204	78	53	256	860	670	73	9	0	3
82	190	107	8	66	19	106	868	374	503	0	0	2
83	236	14	71	18	108	119	447	162	544	4	99	12
84	30	68	91	24	22	296	633	507	573	63	2	1
85	292	33	28	108	268	215	394	701	95	2	0	158
86	224	21	243	14	89	444	924	394	77	102	11	44
87	99	0	11	7	2	138	568	1062	274	15	0	18
88	113	102	52	21	43	99	620	710	260	31	39	6
89	228	305	22	36	83	113	679	693	49	0	0	0
1890	396	21	79	60	40	294	905	777	68	30	43	176
91	291	98	146	41	71	35	357	601	221	74	3	0
92	49	44	10	2	71	102	775	1091	373	5	0	95
93	303	261	72	72	203	387	972	222	728	2	3	34
94	372	96	149	39	34	606	986	574	341	0	33	193
95	228	89	93	63	10	484	286	760	17	2	2	6
96	44	115	46	40	31	197	374	494	48	14	15	29
97	100	47	67	76	36	128	506	677	176	6	0	53
98	29	340	4	1	89	174	728	258	271	0	4	83
99	1	61	15	29	33	281	282	148	27	11	1	0
1900	131	37	38	113	61	56	526	790	746	10	1	127
Mean	1.20	1.03	0.92	0.58	0.73	2.24	6.60	5.63	2.60	0.35	0.14	0.57
1901	151	100	72	19	133	56	500	398	74	6	0	8
02	0	4	38	34	77	224	430	348	212	30	4	0
03	64	2	128	16	68	28	626	451	314	18	0	24
04	135	4	331	4	60	72	252	429	196	14	44	46
05	194	98	90	11	22	64	390	100	450	6	2	60
06	15	340	141	11	11	152	334	506	532	2	0	40
07	63	219	130	182	30	127	218	570	12	1	0	0
08	126	38	2	137	48	48	645	1116	338	2	4	12
09	46	82	12	185	6	242	676	362	409	6	0	138
1910	88	18	10	55	10	254	385	666	174	96	0	12
11	264	26	374	20	10	193	80	215	222	48	84	2
12	188	20	30	101	28	50	448	479	160	2	23	8
13	4	168	104	10	134	256	406	558	68	6	8	40
14	62	136	61	166	69	162	994	302	374	120	40	42
15	50	142	170	66	20	98	158	220	192	44	0	10
16	6	56	22	24	57	156	601	743	207	89	0	1
17	21	6	42	1 6	125	237	476	938	934	202	0	30
18	15	6	201	142	3	79	139	302	66	6	.....	.....
Mean*	0.91	0.91	1.07	0.65	0.49	1.36	4.46	4.66	2.46	0.31	0.13	0.28

* 1917 not included in these means because received after manuscript was sent to printer.

TABLE 9.—The Punjab, India. Means of twenty-five towns, 1863 to 1900. Mean of Punjab meteorological districts, 1901 to 1917.

ACTUAL OBSERVED VALUES IN INCHES.

Cycles.	Phase numbers.														
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
1	209	13	116	36	220	1413	658	70	179	13	59	64	108	48	175
2	152	97	553	658	190	2	0	57	128	322	263	83	49	74	344
3	344	782	518	0	7	203	178	83	32	72	26	233	765	765	695
4	55	20	0	0	34	34	87	(87)	122	170	79	79	536	834	162
5	162	3	0	52	52	89	89	188	130	143	143	48	149	149	502
6	253	253	65	44	0	0	30	139	31	31	447	13	1	135	135
7	766	188	541	56	56	0	8	6	18	154	39	39	11	303	322
8	(639)	178	16	16	0	38	20	206	5	16	16	87	499	548	208
9	115	0	0	93	140	70	86	93	226	893	671	296	6	0	56
10	44	13	48	2	174	29	855	548	224	2	64	127	86	80	26
11	342	700	353	120	0	3	6	80	1	74	626	943	1080	40	46
12	41	149	94	114	702	201	81	132	312	146	112	204	204	113	272
13	75	118	202	143	818	122	6	(24)	4	78	3	69	388	653	116
14	30	73	21	133	4	32	330	828	153	88	14	75	7	92	204
15	78	53	558	670	73	9	0	3	190	107	8	66	19	106	868
16	374	503	0	0	2	236	42	18	108	119	447	162	544	4	99
17	(12)	30	30	68	91	24	22	296	633	507	573	573	63	2	1
18	292	33	28	108	108	268	215	394	701	95	2	2	0	158	224
19	224	21	243	14	89	89	444	924	394	77	77	102	11	44	99
20	99	0	11	7	2	2	138	568	1062	274	274	15	0	18	113
21	113	102	52	21	43	43	99	620	710	260	260	31	39	6	228
22	305	305	20	36	83	113	679	(693)	49	0	0	0	36	21	79
23	60	40	294	905	777	68	30	43	234	98	146	41	71	35	357
24	601	221	74	3	0	49	44	10	2	71	102	775	1091	373	5
25	0	95	303	261	72	72	203	387	972	222	728	2	3	34	372
26	(96)	149	39	606	786	574	341	0	33	210	89	93	63	10	484
27	286	388	2	2	6	44	115	43	31	197	374	494	48	14	15
28	29	100	57	76	36	128	506	677	176	6	0	41	340	4	1
29	89	174	728	258	271	0	44	1	61	15	29	33	281	282	148
30	27	11	1	131	37	38	113	61	56	526	790	746	10	1	127
The 1901-1917 Data Begin Here.															
31	100	72	19	133	56	500	398	(74)	3	8	0	4	38	34	150
32	430	348	212	30	4	0	64	2	128	16	68	28	626	382	18
33	0	24	135	4	331	4	60	72	252	429	196	14	44	46	194
34	98	90	11	22	64	390	100	450	6	2	60	15	340	141	11
35	(11)	152	334	506	532	2	0	40	63	219	130	182	30	127	218

36	570	12	1	0	0	126	38	2	137	48	48	645	1116	338	2
37	4	12	46	82	12	185	6	459	362	409	6	0	138	88	18
38	10	55	10	254	385	666	174	96	0	12	264	26	374	26	10
39	193	80	215	222	48	84	2	188	20	30	101	28	50	448	479
40	160	2	23	6	168	104	10	(134)	256	406	558	68	6	8	40
41	62	136	61	166	69	162	994	302	374	120	40	42	50	50	142
42	170	66	20	98	158	220	192	44	0	10	6	56	22	24	57
43	156	601	743	207	89	0	1	.....	.....	.....	.....	.....	.....	.....	.....

NORMAL VALUES IN INCHES.

1	120	103	92	58	148	660	563	260	35	14	57	120	103	92	58
2	73	224	660	563	260	35	14	57	120	103	92	58	73	224	224
3	660	563	260	35	14	57	120	103	92	58	73	224	660	660	563
4	260	35	14	57	120	103	92	(92)	58	73	224	224	660	563	260
5	260	35	14	57	57	120	120	103	92	58	58	73	224	224	660
6	563	563	260	35	14	14	57	120	103	103	92	58	73	224	224
7	660	563	260	35	35	14	57	120	103	92	58	58	73	224	660
8	(563)	260	35	35	14	57	120	103	92	58	58	73	224	660	563
9	260	35	14	57	120	103	75	73	224	660	563	260	35	14	57
10	120	103	92	58	73	224	660	563	260	24	57	120	103	75	73
11	224	660	563	260	24	57	120	98	58	124	660	563	260	24	57
12	112	92	66	224	612	260	24	88	103	75	73	442	412	35	36
13	120	98	58	148	612	260	24	(57)	120	98	58	73	442	563	260
14	24	57	120	103	75	73	224	660	563	148	14	57	120	103	92
15	56	73	442	563	260	35	4	57	120	103	92	58	73	224	660
16	563	260	35	14	57	120	98	58	73	224	660	563	260	35	14
17	(57)	120	120	103	92	58	73	224	660	563	260	260	35	14	57
18	120	103	92	58	58	73	224	660	563	260	35	35	14	57	120
19	120	103	92	58	73	73	224	660	563	260	260	35	14	57	120
20	120	103	92	58	73	73	224	660	563	260	260	35	14	57	120
21	120	103	92	58	73	73	224	660	563	260	260	35	14	57	120
22	103	103	92	58	73	224	660	(563)	260	35	14	57	120	103	92
23	58	73	224	660	563	260	35	14	88	103	92	58	73	224	660
24	563	260	35	14	57	120	103	92	58	73	224	660	563	260	35
25	14	57	120	103	92	58	73	224	660	563	260	35	14	57	120
26	(103)	92	58	148	660	563	260	35	14	88	103	92	58	73	224
27	660	412	35	14	57	120	103	75	73	224	660	563	260	35	14
28	57	120	98	58	73	224	660	563	260	35	14	88	103	92	58
29	73	224	660	563	260	35	36	120	103	92	58	73	224	660	563
30	260	35	14	120	103	92	58	73	224	660	563	260	35	14	57
31	91	107	65	49	136	446	466	(246)	22	28	91	91	107	65	92
32	446	466	246	31	13	28	91	91	107	65	49	136	446	356	31
33	13	28	91	91	107	65	49	136	446	466	246	31	13	28	91
34	91	107	65	49	136	446	466	246	31	13	28	91	91	107	65
35	(49)	136	446	466	246	31	13	28	91	91	107	65	49	136	446
36	466	246	31	13	28	91	91	107	65	49	136	446	466	246	31
37	13	28	91	91	107	65	49	291	466	246	31	13	28	91	91

TABLE No. 9—CONCLUDED.

NORMAL VALUES IN INCHES—Concluded.

Cycles.	Phase numbers.														
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
38	107	65	49	136	446	466	246	31	13	28	91	91	107	65	49
39	136	446	466	246	31	13	28	91	91	107	65	49	136	446	466
40	246	31	13	60	91	107	65	(49)	136	446	466	246	31	13	28
41	91	91	107	65	49	136	446	466	246	31	13	28	91	91	91
42	107	65	49	136	446	466	246	31	13	28	91	91	107	65	49
43	136	446	466	246	31	13	28	.....	.....	.....	.....	.....	.....	.....	.....
Sum actual, 1–15	3305	2640	3035	2137	2470	2245	1776	2544	1755	2309	2570	2426	3908	3834	4131
Sum normal, 1–15	4077	3414	2508	1725	2178	2037	2270	2554	2143	1791	2229	2461	3535	3909	4447
Quotient	81	77	122	124	113	110	86	100	82	129	115	98	111	98	90
Smoothed	83	93	108	120	116	103	99	89	104	109	114	108	102	100	90
Sum actual, 16–30	2607	2172	1881	2496	2403	1748	3035	4735	5222	2677	3891	3095	2600	1006	2352
Sum normal, 16–30	2991	2168	1859	2087	2364	2166	3055	4681	4745	3700	3723	2849	1801	1795	2374
Quotient	87	100	101	120	102	81	99	101	110	72	105	109	144	56	99
Smoothed	95	96	107	108	101	94	94	103	94	96	95	119	103	100	81
Sum actual, 31–43	1964	1650	1830	1730	1916	2443	2039	1863	1601	1709	1477	1108	2834	1712	1341
Sum normal, 31–43	1992	2262	2185	1679	1867	2373	2284	1813	1727	1598	1414	1378	1672	1709	1530
Quotient	99	73	84	103	103	103	89	103	93	107	104	80	170	100	88
Smoothed	87	85	87	97	103	98	98	95	101	101	97	118	117	119	96
Total actual	7876	6462	6746	6363	6789	6436	6850	9142	8578	6695	7938	6629	9342	6552	7824
Total normal	9060	7844	6552	5491	6409	6576	7609	9048	8615	7089	7366	6688	7008	7413	8351
Quotient	87	82	103	116	106	98	90	101	100	95	108	99	133	88	94
Smoothed	88	91	100	108	107	98	96	97	99	103	101	113	107	105	90

TABLE 10.—Mean rainfall in inches of Ashland, Albany, Cascade Locks, Portland, Roseburg and The Dalles, in Oregon.

Years.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1879	.....	.....	845	281	501	83	131	107	198	302	538	779
1880	960	421	355	291	256	116	36	88	79	145	246	944
81	1080	1152	278	281	108	272	92	102	170	609	446	540
82	419	754	247	399	111	91	85	23	71	716	342	1087
83	878	157	340	519	175	2	0	12	65	344	556	(560)
84	387	540	261	337	105	164	92	15	342	352	198	883
85	346	698	50	105	345	170	9	0	242	180	784	656
86	787	275	400	305	149	38	96	2	246	278	168	996
87	1207	354	588	423	289	104	7	23	171	135	370	1024
88	732	189	284	123	102	486	104	8	67	376	427	427
89	294	98	212	266	280	62	22	60	145	399	381	549
1890	917	1038	496	133	88	209	32	29	36	233	49	383
91	387	701	320	259	211	265	58	76	174	396	539	1127
92	450	202	263	410	159	75	61	8	124	233	551	650
93	186	592	353	541	255	110	19	4	337	529	799	522
94	1040	(536)	826	266	171	236	32	2	188	434	257	473
95	770	140	336	217	343	35	44	13	204	5	360	984
96	714	393	357	446	396	94	6	71	76	208	1244	679
97	270	654	578	170	88	188	45	41	193	201	927	833
98	412	537	216	157	164	145	54	76	260	155	715	368
99	622	562	445	379	248	80	10	237	118	366	746	626
1900	472	432	372	158	273	195	16	81	176	545	427	498
01	689	652	367	249	193	99	8	30	(326)	115	482	546
02	324	784	481	600	242	69	124	50	123	134	944	927
03	801	145	289	164	116	194	48	43	132	220	993	278
04	492	1013	813	236	58	64	72	13	56	544	451	763
05	344	160	440	83	236	128	7	17	201	408	256	619
06	538	538	250	160	279	238	0	8	198	262	777	607
07	674	492	424	371	135	130	53	141	148	100	569	1064
08	402	290	419	192	276	97	14	80	32	451	295	378
09	850	632	204	92	184	44	106	18	112	289	1185	376
1910	552	590	248	245	215	116	1	4	79	322	961	401
11	680	275	98	206	300	71	16	10	378	98	406	457
12	873	492	253	272	243	254	44	231	172	302	550	629
13	663	136	409	250	190	321	86	40	204	319	541	287
14	994	376	262	305	143	172	6	0	296	414	370	217
15	461	390	230	186	326	72	103	6	50	198	981	728
16	504	588	775	277	254	135	239	38	70	98	558	432
17	340	383	444	904	200	70	10	6	114	6	506	1123
18	606	559	289	116	164	17	74	60	134	379	440	354
19	760	762	520	334	164	71	14	4	256	217	656	514
1920	375	21	415	358	90	166	62	106	409	344	592	810
21	652	645	433	262	149	115	3	22	223	279	1011	296
Mean	6.12	4.88	3.83	2.87	2.09	1.36	0.50	0.46	1.72	2.94	5.84	6.37

TABLE 11.—Mean rainfall in inches of Folsom, Hollister, Los Angeles, Marysville, Merced, Sacramento, San Francisco, San Jose, San Luis Obispo, Santa Barbara, San Bernardino, San Diego and Stockton, in California.

Years.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1878	635	769	272	174	30	3	1	0	16	47	44	(174)
79	289	246	278	184	86	7	1	1	0	79	233	383
1880	139	271	138	668	64	0	1	2	0	9	37	832
81	370	239	122	107	4	20	0	0	22	80	79	175
82	166	229	354	161	20	14	0	0	31	132	184	56
83	165	123	306	90	169	4	1	0	42	104	42	(148)
84	343	697	778	194	74	154	0	1	15	131	20	572
85	154	17	45	174	20	9	3	1	3	17	774	168
86	573	82	227	370	11	2	4	2	0	19	63	118
87	68	664	91	191	15	6	2	0	39	14	97	272
88	484	109	300	21	39	11	1	1	33	7	365	405
89	59	95	559	64	136	10	1	7	3	512	260	970
1890	574	318	247	76	86	2	1	17	74	5	24	306
91	59	594	157	160	58	10	2	7	23	5	30	363
92	147	251	309	87	209	6	0	0	6	69	375	434
93	314	287	560	86	33	0	2	0	10	34	152	208
94	284	(256)	69	35	131	35	1	2	88	113	39	672
95	681	160	208	93	61	0	1	0	49	44	118	101
96	619	12	250	280	58	0	5	31	18	117	280	210
97	304	435	187	41	19	4	0	1	7	149	40	97
98	113	60	189	25	116	6	1	0	60	43	44	109
99	333	16	421	51	38	53	0	5	0	294	269	222
1900	271	28	143	156	146	2	3	0	10	108	479	81
01	407	485	59	178	72	1	0	6	46	140	177	60
02	120	506	275	121	48	2	7	0	0	100	226	209
03	290	164	570	134	6	0	0	1	7	8	197	68
04	68	416	468	145	17	0	0	11	252	160	97	173
05	308	422	404	87	184	4	3	1	7	5	181	76
06	457	341	729	128	205	38	1	2	18	1	107	691
07	579	264	648	40	10	48	0	0	2	180	5	296
08	398	312	77	28	67	1	1	6	43	47	117	164
09	957	510	274	2	0	5	0	10	23	72	186	578
1910	280	99	274	26	2	0	1	1	41	65	39	98
11	1109	298	530	76	15	3	1	0	27	27	28	176
12	189	17	415	211	98	24	1	2	49	56	88	38
13	263	220	115	54	56	20	15	10	3	4	382	357
14	884	395	73	110	24	31	1	0	4	75	46	413
15	514	623	131	115	225	0	0	4	1	0	67	414
16	1173	253	159	18	12	0	3	8	72	135	69	410
17	217	431	82	66	26	0	2	1	14	2	46	32
18	75	482	531	51	6	9	3	6	230	34	265	182
19	136	470	230	27	20	0	0	2	74	31	32	226
1920	44	213	420	115	12	8	0	1	4	139	218	353
21	447	113	209	39	171	1	0	0	36	44	92	654
Mean	3.65	2.95	2.93	1.20	0.66	0.13	0.02	0.03	0.34	0.79	1.48	2.90

TABLE 12.—Nineteen California and Oregon stations, March 1879 to 1917. Given in inches.

SUMS OF ACTUAL VALUES OF ALL STATIONS.

Cycles.	Phase numbers.														
	(11)	(12)	(13)	(14)	(15)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1	4085	4127	696	647	1191	4545	9656	7571	6041	7184	2362	700	225	563	728
2	1965	16480	11282	10024	3252	3074	707	1218	612	1302	4689	3707	5518	4668	7498
3	6084	4492	928	728	510	138	830	6014	4446	7245	7406	4280	4282	4543	109
4	20	74	936	3413	3881	(5288)	6779	6779	12309	11688	7144	1584	2982	551	100
5	2253	2253	3813	1444	12730	4083	4422	881	2897	2897	2329	1140	91	16	1494
6	1297	1297	14765	7424	12170	12170	2715	5349	6644	1041	1041	251	626	32	1480
7	1480	2304	1825	7518	8122	8122	10755	4706	5019	1937	1937	710	66	142	1540
8	1540	1001	3486	9681	10680	10680	2547	5607	1007	1121	1121	3057	629	60	835
9	835	2331	7305	7829	2523	1824	1824	8542	2436	3454	506	152	(458)	914	9043
10	5674	15902	12963	10359	6181	1784	1647	1280	204	392	1186	1471	604	4686	11934
11	3959	3628	2025	1717	370	546	1339	2445	3623	11484	4608	4468	5535	3592	3611
12	530	368	57	819	2290	8178	9541	5193	7275	9399	4362	1959	868	134	22
13	2148	3617	6774	5838	9936	(6544)	5844	2390	1878	213	34	2275	4070	2042	12521
14	2920	4672	2509	2856	217	269	970	598	3700	7224	12326	2509	5852	3135	567
15	109	825	674	2772	11112	6806	5574	8390	1550	776	1180	272	258	1244	3147
16	6084	5104	4007	3745	1265	2498	946	333	456	2332	1493	4242	8066	3583	8142
17	2942	1979	1174	58	1483	712	6024	7304	6351	2953	4087	2976	3536	1192	121
18	484	1184	4677	8789	6730	10216	2974	3810	2090	609	51	254	(2546)	3850	4056
19	3495	11285	6466	3975	1254	835	301	739	2104	8607	8287	8581	3006	9140	2725
20	770	1170	290	579	1433	8524	2546	3830	11489	10965	3297	565	385	436	215
21	3615	3543	3969	6824	6016	6445	7892	1634	3811	816	79	112	1295	2498	3877
22	4100	9175	7665	10978	2628	(4336)	1915	10	77	1422	1582	6057	12630	11570	6389
23	10959	2747	945	1405	322	851	916	2934	3480	10232	7589	5784	3509	1459	2531
24	604	93	556	760	3315	3294	4391	17675	10425	4793	571	1108	482	234	972
25	2676	9526	9747	6958	4831	5042	1804	1310	699	26	35	1033	2771	6280	3774
26	18498	5517	7471	2228	2002	468	109	63	2626	938	2804	5038	7690	3177	6929
27	4380	2734	1842	277	1416	1676	2541	4385	5832	3683	3952	2198	(1867)	2189	714
28	366	1255	1963	8215	6362	17459	7381	2522	3256	1176	1440	41	1	1822	3459
29	2818	6674	9398	9398	10443	3092	2606	4883	431	618	91	309	1186	6752	9749
30	18270	6822	6717	1897	1677	813	1478	332	1562	2334	4238	7917	4861	7895	3737

SUMS OF NORMAL VALUES OF ALL STATIONS.

1	4711	2161	991	323	1455	2747	6463	8516	6739	6114	2734	991	325	321	1455
2	4064	7546	8516	6739	6114	3308	2161	991	323	1455	2747	5380	7546	8516	6739
3	6114	3308	2161	991	325	321	1455	2747	5380	7546	8516	6739	4711	2161	991
4	325	321	1455	2747	5380	(7546)	8516	8516	6739	6114	3308	2161	991	325	321
5	1455	1455	2747	5380	7546	8516	6739	6114	3308	3308	2161	991	325	321	1455

6	2747	2747	5380	7546	8516	8516	6739	6114	3308	2161	2161	991	325	321	1455
7	1455	2747	5380	7546	8516	8516	6739	6114	3308	2161	2161	991	325	321	1455
8	1455	2747	5380	7546	8516	8516	6739	6114	3308	2161	2161	991	325	321	1455
9	1455	2747	5380	7546	8516	6739	6739	6114	3308	2161	991	325	(321)	1455	2747
10	5380	7546	8516	6739	6114	3308	2161	991	325	321	1455	2747	5380	7546	7628
11	6114	3308	2161	991	325	321	1455	2717	5380	7546	8516	6739	6114	3308	2161
12	991	325	321	1455	2747	5380	7546	8516	6739	6114	3308	2161	991	325	321
13	1455	2747	5380	7546	8516	(6739)	6114	3308	1576	325	321	1455	2747	5380	7546
14	7628	6114	3308	2161	991	325	321	2101	5380	7546	8516	6739	6114	2734	991
15	325	321	1455	2747	5380	7546	8516	6739	4711	2161	991	325	321	1455	2747
16	5380	7546	7628	6114	3308	2161	991	325	321	1455	2747	5380	8031	6739	6114
17	3308	2161	991	325	321	1455	2747	5380	8031	6739	6114	3308	2161	991	325
18	321	1455	2747	5380	7546	7628	6114	3308	2161	991	325	321	(1455)	2747	6463
19	8516	6739	6114	3308	2161	658	321	1455	2747	5380	7546	8516	6739	6114	3308
20	2161	991	325	321	2101	5380	7546	8516	6739	6114	3308	2161	991	325	321
21	1455	2747	5380	7546	8516	6739	6114	3308	2161	991	325	321	1455	2747	5380
22	7546	8516	6739	6114	3308	(2161)	991	325	321	1455	2747	5380	7546	8516	6739
23	6114	3308	2161	991	325	321	1455	2747	5380	7546	8516	6739	6114	3308	2161
24	991	325	321	1455	2747	5380	7546	8516	6739	6114	3308	2161	991	323	1455
25	2747	5380	7546	8516	6739	6114	3308	2161	991	325	321	1455	2747	5380	7546
26	8516	6739	6114	3308	2161	991	325	321	1455	2747	5380	7546	8516	6739	6114
27	3308	2161	991	325	321	1455	2747	5380	7546	7628	6114	3308	(2161)	991	325
28	321	1455	2747	5380	7546	8516	6739	6114	3308	2161	991	325	321	1455	2747
29	5380	7546	8516	8516	6739	6114	3308	2161	991	325	321	1455	2747	5380	7546
30	8516	6739	6114	3308	2161	991	325	321	1455	2,47	5380	7546	8516	6739	6114
Sum actual, 1–15	34899	63371	70038	85879	85165	74051	65150	66963	59645	67357	52231	28535	31864	26322	54629
Sum normal, 1–15	45674	46140	57531	68003	78957	78344	78403	75712	59832	57194	50047	39726	36861	34810	39467
Quotient	76	137	122	126	108	95	88	88	100	118	104	72	86	76	139
Smoothed	117	112	128	119	110	97	90	92	102	107	98	87	78	100	97
Sum actual, 16–30	80061	68808	68887	66086	51177	66261	43824	51991	54689	51504	39596	46215	53831	62077	57390
Sum normal, 16–30	64580	39808	64434	60907	56000	56065	50577	50338	50346	52718	53443	55922	60491	58494	62658
Quotient	124	173	104	119	91	118	87	103	109	98	74	83	89	106	92
Smoothed	130	134	132	105	109	99	103	100	103	94	85	82	93	96	107
Total sum, actual	114960	132179	136925	151965	136342	140312	108974	108954	114334	118861	91827	74750	85695	88399	112019
Total sum, normal	110254	85948	121965	128910	134957	134409	128980	126050	110178	109912	103490	95648	97352	93304	102125
Quotient	104	154	112	118	101	104	85	94	104	108	89	78	88	95	110
Smoothed	123	123	128	110	108	97	94	94	102	100	92	85	87	98	103

TABLE 13.—Per cent of normal rainfall at Chilgrove, West Sussex, England. Compiled from table of actual rainfall in "British Rainfall, 1919."

Years.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1834	107	135	73	55	57	129	322	78	24	41	107	57
35	38	169	121	39	76	91	11	26	195	135	146	12
36	96	90	226	262	19	62	99	91	127	139	186	54
37	144	160	24	73	34	45	47	77	78	84	58	90
38	17	71	122	51	84	167	49	64	91	53	191	123
39	38	143	83	92	34	54	226	89	218	83	111	210
1840	114	100	0	21	85	78	128	71	151	45	173	19
41	128	121	96	77	143	108	79	146	157	167	156	92
42	62	126	65	44	75	22	46	73	192	37	201	67
43	81	97	66	149	298	113	87	128	22	118	104	26
44	122	125	138	26	21	57	78	99	31	120	117	19
45	105	76	48	95	113	90	92	86	94	64	113	99
46	168	88	93	80	117	45	89	173	56	156	66	48
47	47	88	46	71	82	87	40	57	58	68	77	173
48	75	232	209	185	22	191	161	182	94	96	73	124
49	94	86	57	174	145	39	90	32	168	110	63	107
1850	67	82	19	218	132	108	157	100	94	56	96	68
51	153	38	190	93	73	92	90	50	0	106	27	28
52	159	106	23	26	106	286	62	172	192	154	244	156
53	156	45	89	177	109	108	244	115	117	141	45	19
54	99	33	18	8	189	82	32	45	39	95	52	62
55	22	61	127	23	143	56	170	44	88	171	48	48
56	126	55	54	198	185	96	30	142	136	76	29	82
57	93	18	95	108	65	100	57	80	153	196	59	37
58	52	42	72	137	116	43	111	85	83	52	50	98
59	76	90	81	168	59	56	106	58	141	98	143	102
1860	136	61	94	90	186	291	109	167	125	68	102	97
61	24	85	128	39	75	101	182	24	128	43	142	55
62	100	31	172	58	172	113	103	79	73	122	41	89
63	123	38	52	29	114	195	34	66	136	103	63	93
64	64	60	146	76	77	58	14	34	138	45	123	40
65	136	106	54	22	140	98	92	182	10	236	99	85
66	150	183	77	81	69	127	75	107	262	36	59	78
67	114	109	88	106	68	80	100	113	73	67	29	44
68	136	62	89	134	58	26	35	159	111	95	46	256
69	110	119	78	56	212	84	43	51	195	55	70	120
1870	75	138	90	11	70	19	61	121	65	114	56	102
71	110	79	63	246	29	166	200	58	165	42	24	64
72	242	116	119	49	136	88	114	53	83	142	153	168
73	153	131	105	38	71	109	98	67	103	107	82	21
74	80	95	26	144	19	134	54	83	89	117	80	80
75	149	98	65	71	59	140	166	55	85	133	150	38
76	36	151	132	110	27	69	34	103	167	54	122	212
77	259	84	121	155	162	26	133	160	63	88	226	86
78	66	120	72	156	109	86	43	184	66	88	142	54
79	78	175	29	191	133	201	174	211	152	31	20	22
1880	10	128	46	100	101	101	210	34	163	208	109	122
81	48	136	91	27	74	101	133	184	100	53	135	99
82	58	82	40	197	68	153	131	76	78	222	51	81
83	94	202	35	66	101	105	130	384	133	67	153	38
84	96	106	124	80	44	61	97	44	108	33	38	116
85	62	175	99	61	234	110	22	374	171	99	101	41
86	136	42	96	91	225	28	156	75	57	133	110	171
87	93	33	49	78	50	47	38	83	136	33	148	71
88	47	34	183	86	91	158	292	95	37	48	157	65
89	30	60	92	109	232	33	92	81	27	185	43	68
1890	121	47	73	145	87	151	155	119	55	27	95	18
91	106	2	180	52	114	87	117	251	43	170	134	134
92	39	35	42	47	46	95	100	109	109	108	112	76
93	61	146	10	2	42	72	155	27	65	123	80	103
94	214	108	82	132	64	96	212	61	92	128	190	93
95	98	6	121	162	12	32	201	135	214	99	196	109
96	61	24	202	34	27	184	42	45	308	92	32	182
97	103	173	260	146	67	116	28	200	105	12	47	138
98	30	71	38	67	207	123	143	65	71	98	139	86
99	110	110	35	152	43	82	69	25	112	68	165	68

TABLE 13—CONTINUED.

YEARS.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1900	153	302	44	97	55	165	47	126	44	66	128	144
01	44	76	121	158	60	157	108	62	82	73	17	165
02	46	111	101	57	112	165	51	233	38	73	137	72
03	108	81	183	141	174	119	134	197	154	250	75	96
04	213	199	64	104	218	55	59	85	99	67	41	125
05	45	34	254	100	24	190	13	124	79	58	157	40
06	305	185	65	51	175	57	17	37	54	137	163	79
07	45	78	51	267	143	140	68	75	21	174	97	134
08	51	77	150	123	123	32	140	148	64	77	42	124
09	35	19	222	80	86	145	131	77	130	221	21	158
1910	107	187	71	136	56	84	85	117	4	123	126	147
11	50	96	93	80	143	103	30	18	42	147	159	256
12	126	130	213	0	57	161	80	266	108	84	58	136
13	185	64	150	183	158	23	75	66	56	140	104	55
14	31	203	222	91	75	60	126	61	58	75	108	275
15	138	222	40	75	186	84	166	52	83	96	105	297
16	50	155	148	60	93	100	39	123	89	136	140	113
17	53	53	100	107	104	170	98	200	59	108	51	52
18	138	74	69	108	85	41	168	67	224	34	98	99
19	237	133	286	129	11	25	72	133	50	8	198	199
Normal in inches.	3.20	2.45	2.32	1.95	2.07	2.31	2.65	3.02	3.08	4.22	3.53	3.51

TABLE 14.—Per cent of normal rainfall at Utrecht, Holland.

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
1849	73	164	64	153	91	60	136	56	47	157	85	145	103
50	115	230	84	228	117	39	64	149	43	108	118	124	118
51	57	73	138	141	102	40	146	82	42	45	187	27	90
52	162	187	94	22	160	155	45	178	135	296	147	110	141
53	145	103	52	239	80	149	105	87	132	120	7	36	105
54	122	164	26	54	132	120	63	81	87	160	123	221	113
55	80	51	64	50	76	90	182	68	34	165	44	84	82
56	113	143	33	155	218	110	66	105	112	20	192	77	112
57	120	14	77	125	13	35	96	48	104	46	51	20	62
58	85	40	41	48	71	109	142	177	39	85	32	105	144
59	47	75	209	160	34	64	79	84	130	93	88	68	94
1860	127	93	167	103	143	82	73	88	113	71	93	42	100
61	19	48	127	98	114	183	121	84	152	4	126	34	92
62	107	44	43	63	60	102	125	75	61	128	42	85	78
63	75	72	63	50	61	97	36	79	128	40	65	99	72
64	38	65	93	23	62	107	26	101	123	43	59	14	63
65	99	117	93	19	86	18	256	218	14	105	39	13	90
66	120	129	111	87	73	70	141	102	190	14	194	122	113
67	137	104	58	119	53	112	142	41	120	90	57	108	95
68	95	87	133	94	61	26	25	116	34	83	47	138	78
69	74	157	79	50	267	79	53	102	118	133	142	96	112
1870	83	20	110	39	57	40	82	210	71	149	84	164	92
71	59	50	34	161	33	133	172	28	136	101	64	75	87
72	114	92	81	65	101	90	117	86	172	176	159	158	118
73	65	72	42	89	141	95	52	84	162	95	41	22	80
74	94	55	133	39	163	71	53	61	181	76	156	83	97
75	110	77	68	37	71	85	182	185	121	56	182	42	101
76	33	156	172	109	108	79	42	66	213	61	95	85	102
77	187	208	136	68	87	43	108	152	59	92	142	92	114
78	118	54	177	80	196	49	38	120	93	91	163	72	104
79	89	120	27	194	63	118	162	118	66	83	68	28	95
1880	59	80	75	67	24	178	94	62	137	172	141	173	105
81	56	182	147	53	175	124	48	155	103	66	48	150	109
82	76	74	163	121	106	248	129	130	131	104	155	127	130
83	71	67	84	7	75	52	140	65	93	104	142	83	82
84	150	63	59	43	70	28	138	64	88	94	79	141	85
85	94	127	57	45	151	56	9	55	124	212	83	54	89
86	189	64	103	43	158	130	106	54	29	82	79	139	98
87	33	20	59	96	109	18	22	39	74	133	83	101	66
88	46	64	179	81	51	170	168	75	46	99	66	53	92
89	33	138	103	89	152	130	167	160	163	87	82	115	118
1890	160	9	100	157	68	69	172	120	41	163	200	7	106
91	141	21	113	68	154	207	120	81	67	57	77	176	107
92	142	77	64	38	47	142	51	66	187	202	87	108	101
93	81	285	51	1	42	24	122	75	147	113	131	110	98
94	98	249	106	132	67	122	188	153	112	95	115	131	131
95	108	35	162	96	72	92	104	103	34	110	138	155	101
96	91	13	116	74	14	61	75	99	219	123	96	97	90
97	35	90	144	174	86	119	42	129	144	70	68	132	103
98	80	212	97	109	162	128	109	62	174	70	118	104	119
99	146	102	49	201	174	11	73	182	207	94	55	83	115
1900	120	127	46	101	100	140	78	150	23	134	48	117	99
01	86	64	141	197	66	81	117	83	169	108	102	145	113
02	80	79	93	84	154	40	105	132	66	59	54	92	86
03	77	79	135	292	115	152	105	112	161	165	143	40	131
04	108	136	74	48	135	120	31	74	63	59	100	79	86
05	59	87	155	120	73	110	102	140	75	200	99	42	105
06	206	118	105	62	185	81	79	73	52	77	101	105	104
07	69	111	107	93	132	162	43	60	56	101	71	124	94
08	97	129	83	75	118	113	97	126	56	36	98	54	90
09	40	85	126	215	77	66	116	163	93	136	70	166	113
1910	110	173	67	162	91	132	133	82	107	27	187	126	115
11	53	101	108	67	49	183	28	196	52	157	156	110	105
12	114	126	162	90	125	208	56	265	152	89	140	140	136
13	135	73	132	45	176	189	129	21	28	65	117	115	102
14	114	72	278	93	88	90	113	45	124	52	100	166	111
15	196	201	116	99	158	91	126	115	70	28	163	160	127
16	138	182	170	186	135	190	42	119	59	129	86	119	130
17	89	15	54	120	36	161	84	230	57	215	83	54	100
18	193	111	51	74	37	87	178	62	291	103	79	154	118
19	92	92	132	150	44	77	170	58	62	87	97	167	102
1920	155	92	38	203	124	45	130	137	39	14	24	88	91
21	156	25	62	67	41	75	150	35	32	34	56	.....	.....
Normals.	5.44	4.30	4.98	4.33	4.93	5.89	7.58	8.36	6.51	7.27	5.96	6.89	.....

TABLE 15.—Number of rainfall stations in the different counties in Denmark.

Counties.	Year.											
	1865.	1870.	1875.	1880.	1885.	1890.	1895.	1900.	1905.	1910.	1915.	1920.
Hjørring	1	1	4	5	7	8	9	9	9	11	7	8
Thisted	0	0	6	6	7	7	6	6	7	6	7	6
Ringkjøbing	2	2	7	9	9	9	33	30	29	28	25	26
Ribe	0	1	4	6	8	10	18	18	18	17	15	12
Viborg	3	3	6	5	5	9	11	10	10	8	7	8
Aalborg	0	1	5	5	6	7	8	7	8	9	10	13
Randers	1	1	9	7	8	9	9	7	7	8	9	11
Aarhus	4	3	7	7	8	15	17	17	20	22	21	20
Vejle	0	1	7	7	8	9	11	10	11	9	9	10
Sønderjylland	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	25
Odense	1	1	11	12	12	17	17	18	20	20	20	20
Svendborg	1	1	9	11	10	17	16	17	17	18	16	16
Holbæk	0	0	7	10	11	11	12	10	10	11	11	11
Sorø	1	2	4	5	6	9	8	11	10	9	13	14
Frederiksborg	0	1	5	8	5	5	4	5	8	6	10	11
Kjøbenhavns	4	4	12	12	14	14	15	13	13	13	15	14
Præsto	0	0	13	14	14	17	14	14	13	17	22	21
Maribo	1	2	9	15	18	14	14	14	14	15	16	16
Total number	19	24	125	144	156	187	222	216	224	227	233	262

TABLE 15*a*.—Denmark. Observed per cent of normal rainfall of stations shown above made from manuscript copy of actual rainfall sent by Prof. Carl Ryder.

Years.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1860	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	58
61	40	113	150	77	77	163	133	92	155	12	189	37
62	87	45	79	80	97	178	117	63	108	132	71	130
63	113	83	103	114	77	151	68	76	160	62	71	104
64	54	86	126	54	82	190	57	125	149	61	88	23
65	80	86	39	17	72	43	99	126	31	112	101	29
66	150	240	55	125	118	116	101	126	144	30	150	114
67	157	166	82	193	113	99	170	31	147	110	65	70
68	115	143	158	111	31	33	49	79	123	114	80	236
69	82	139	45	37	153	81	46	75	110	114	123	116
1870	96	30	61	54	64	78	63	98	93	145	123	66
71	33	131	45	97	46	161	131	46	157	39	47	70
72	115	68	182	131	166	99	73	87	196	101	150	118
73	127	45	42	82	189	58	104	111	155	176	97	77
74	120	39	110	88	64	66	95	106	139	82	67	103
75	185	18	71	63	84	110	80	71	51	145	155	411
76	26	157	218	128	49	93	52	51	159	51	71	147
77	183	157	87	85	87	87	140	170	108	123	121	79
78	136	45	137	71	161	83	82	123	98	91	144	97
79	35	154	47	82	148	169	148	173	88	80	62	37
1880	23	166	63	114	49	116	164	43	139	171	176	116
81	42	71	87	20	87	60	121	157	118	139	105	77
82	89	74	124	131	110	178	151	114	72	121	168	79
83	75	68	34	56	46	66	145	110	113	124	170	103
84	172	134	92	45	105	52	117	44	79	130	64	137
85	92	116	39	99	130	83	41	107	149	145	54	60
86	124	50	79	94	94	75	90	44	77	88	86	139
87	21	27	66	102	133	31	82	46	129	119	101	97
88	54	135	163	122	84	153	180	84	52	82	101	87
89	28	92	79	82	46	52	117	149	96	170	54	43
1890	127	15	108	139	135	103	150	129	34	129	82	15
91	96	36	134	94	153	62	137	210	92	95	75	132
92	129	77	39	74	115	194	43	92	110	135	41	58
93	82	175	63	9	66	60	120	78	146	150	95	85
94	96	143	121	114	89	95	117	118	61	97	75	77
95	66	74	121	65	84	93	156	114	34	127	140	112
96	49	27	168	102	64	66	66	109	177	145	47	87
97	49	50	229	105	187	50	128	141	124	39	54	120
98	99	151	132	94	217	202	71	102	72	38	97	170
99	157	116	82	142	82	25	69	36	138	91	82	83
1900	148	181	50	134	79	109	115	95	78	160	69	128
01	77	53	116	162	89	190	54	58	39	53	121	130
02	(136)	30	132	63	199	66	84	146	59	83	17	77
03	103	160	84	148	84	76	128	139	92	233	93	41
04	96	160	79	160	120	78	28	75	38	82	129	110
05	80	68	150	151	87	91	85	147	125	132	75	29
06	167	(113)	108	74	115	83	57	112	51	76	146	74
07	92	80	76	57	118	194	79	103	28	82	82	132
08	99	151	121	125	146	91	85	107	88	17	84	48
09	82	45	100	139	110	107	107	79	116	110	107	163
1910	153	211	45	139	84	132	115	143	61	35	136	116
11	75	181	137	80	67	161	58	47	46	141	193	120
12	54	107	124	108	113	132	110	155	70	124	123	196
13	70	83	158	74	69	87	58	71	80	77	133	141
14	54	101	192	125	84	70	139	54	90	70	120	137
15	131	80	105	63	95	29	155	74	65	33	107	215
16	190	101	66	122	148	153	91	129	62	129	120	164
17	101	21	134	97	28	87	71	135	98	148	144	58
18	94	140	16	136	38	81	110	99	208	70	41	141
19	108	104	103	134	28	91	112	87	77	70	92	153
1920	162	143	66	256	156	58	129	88	97	21	34	104
21	218	65	82	65	77	56	49	108	64	91	.....	.....
Normals in mm.	42.6	33.7	38.0	35.2	39.1	48.4	63.4	74.7	61.2	66.2	53.6	51.7

TABLE 16.—Sweden. Observed per cent of normal. Prepared from material from "Observations Meteorologiques Suedoises L'Academie Royale des Sciences de Suede," for 1910.

Years.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1860	180	90	111	138	113	167	72	165	109	134	86	97
61	72	104	119	50	116	57	128	118	107	27	190	42
62	65	58	72	129	81	175	132	68	59	137	105	104
63	107	77	89	137	64	88	69	100	157	76	73	94
64	44	112	136	61	58	134	65	102	127	73	95	46
65	113	84	47	24	110	59	94	114	36	101	98	34
66	119	238	91	91	139	118	122	15	155	23	152	127
67	186	115	64	173	56	145	136	53	99	109	90	128
68	101	155	144	122	58	42	53	85	132	126	74	127
69	45	132	46	58	173	124	46	110	102	121	112	97
1870	140	60	48	83	102	90	92	68	108	111	189	91
71	46	52	263	58	169	58	59	24	168	41	34	45
72	108	99	120	140	162	142	70	94	181	163	157	131
73	191	72	52	49	136	107	79	105	155	152	133	76
74	84	33	93	96	48	43	76	95	106	97	77	121
75	146	34	89	65	76	97	78	78	35	57	102	77
76	72	133	134	123	55	110	70	71	216	105	82	101
77	144	149	154	78	91	82	52	123	78	93	158	93
78	84	27	122	49	156	127	63	110	100	97	151	133
79	58	131	48	132	121	121	124	94	124	98	63	44
1880	281	133	34	76	65	72	126	39	77	93	131	135
81	49	257	86	53	103	98	117	131	120	98	105	90
82	83	91	117	162	114	118	148	130	65	94	147	120
83	73	54	59	50	80	101	172	123	148	97	178	91
84	126	83	90	44	125	146	133	38	75	122	51	170
85	42	50	36	30	51	32	25	57	45	73	21	25
86	53	13	39	58	27	29	21	13	22	22	41	64
87	83	39	50	120	92	53	115	87	132	83	11	140
88	61	92	108	81	101	67	158	83	90	121	77	124
89	69	133	72	81	71	59	146	124	115	106	69	52
1890	136	256	117	242	136	122	149	137	41	152	153	81
91	103	50	100	58	125	53	113	149	99	115	110	126
92	80	84	67	108	72	172	78	127	107	110	24	80
93	88	102	83	43	90	80	103	107	153	182	78	111
94	119	108	117	102	148	96	133	125	77	91	71	119
95	70	92	152	83	70	109	178	135	66	132	117	80
96	79	48	200	115	76	124	88	126	108	164	68	99
97	92	90	173	123	119	75	106	125	135	53	83	142
98	78	160	177	88	167	158	155	115	75	50	122	188
99	151	100	87	186	78	72	84	46	185	104	90	97
1900	116	178	67	107	78	71	99	116	72	161	131	147
01	64	63	101	106	50	160	32	70	37	116	79	135
02	108	50	118	37	111	82	132	153	79	114	30	77
03	113	99	102	195	78	92	114	188	84	145	60	79
04	96	152	84	149	131	101	30	127	70	95	104	120
05	68	53	98	122	63	87	112	139	109	86	101	29
06	122	116	121	109	155	88	78	91	35	70	161	86
07	106	104	77	127	105	158	144	113	40	90	63	123
08	78	126	115	102	104	120	84	95	97	20	86	86
09	88	40	205	130	102	102	116	109	92	156	64	179
1910	125	155	52	164	130	87	131	93	95	53	252	98
Normals	3.54	3.03	3.12	2.74	3.92	4.58	6.12	6.91	5.43	5.13	4.06	3.71

TABLE 17.—Per cent of normal rainfall of Chilgrove, England; Denmark; Sweden, and Utrecht, Holland—weighted equally because of geographical distribution. The record of Sweden is not included after December, 1910.

Years.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1861	39	88	131	66	96	126	141	80	136	22	162	42
62	90	44	92	82	102	142	119	71	75	130	65	102
63	104	68	77	82	79	133	53	80	145	70	68	98
64	50	81	125	54	70	122	40	90	134	56	91	31
65	107	98	58	20	102	54	135	160	23	138	84	40
66	135	198	84	96	100	108	110	88	188	26	139	110
67	148	124	73	148	72	109	157	59	110	94	60	88
68	112	112	131	115	52	32	40	110	100	104	62	189
69	78	137	62	50	201	92	47	84	131	106	112	107
1870	98	62	77	47	73	57	74	124	84	130	113	106
71	62	78	101	140	69	130	140	39	156	56	42	64
72	145	94	126	96	141	105	94	80	158	146	155	144
73	134	80	60	64	134	92	83	92	144	132	88	49
74	94	56	90	92	165	78	70	156	129	93	95	97
75	148	57	73	59	72	108	126	97	73	98	147	50
76	42	149	164	118	60	88	50	73	189	68	92	136
77	193	150	125	96	107	60	108	151	77	99	162	88
78	101	62	127	89	156	86	56	134	89	92	150	89
79	65	145	38	150	116	152	152	149	108	73	53	33
1880	93	127	54	89	60	117	148	44	130	161	139	136
81	49	162	103	38	110	96	105	157	110	89	98	104
82	76	80	111	153	100	174	140	112	86	135	130	102
83	78	98	53	45	76	81	147	170	122	98	161	79
84	136	96	91	53	86	72	121	48	88	95	58	141
85	72	117	58	59	142	70	24	148	122	132	65	45
86	170	42	79	72	126	66	91	46	46	81	79	172
87	230	30	56	99	96	37	64	64	118	92	86	102
88	52	81	158	92	82	137	200	84	56	88	100	82
89	40	106	86	90	125	68	130	128	100	137	62	70
1890	136	82	127	171	106	111	156	126	43	118	132	30
91	112	27	132	68	136	102	122	173	75	109	99	142
92	98	68	53	67	70	151	68	98	128	139	66	80
93	78	177	52	14	60	59	125	72	128	142	96	102
94	132	152	106	120	92	102	162	114	86	103	113	105
95	86	52	139	102	60	82	160	122	87	117	148	114
96	70	28	172	81	45	109	68	95	203	131	61	116
97	70	101	202	137	115	90	76	149	127	44	63	133
98	72	148	111	90	188	153	120	86	98	64	119	137
99	141	107	63	170	94	48	74	72	160	89	98	83
1900	134	197	52	110	78	121	85	122	54	130	94	134
01	68	64	120	156	66	147	78	68	82	88	80	144
02	92	68	111	60	144	88	93	166	60	82	60	80
03	100	105	126	194	113	110	120	159	123	198	93	64
04	128	162	75	116	151	88	37	93	68	76	93	108
05	63	60	164	123	62	120	78	138	97	119	108	35
06	200	133	100	74	158	77	58	78	48	90	143	86
07	78	93	78	136	124	164	84	88	36	112	78	123
08	81	121	117	106	123	89	102	119	76	38	78	78
09	61	47	163	141	94	105	118	107	108	156	66	166
1910	124	182	59	150	90	109	118	109	67	60	176	122
11	59	126	113	76	86	149	39	87	47	148	169	162
12	98	121	166	66	98	167	82	229	77	99	107	157
13	130	73	147	101	134	100	87	53	55	94	118	104
14	66	125	231	103	83	73	126	52	91	66	109	193
15	155	167	87	79	146	68	149	80	73	52	125	224
16	123	147	128	123	125	148	57	124	70	131	115	132
17	81	30	96	108	56	139	84	188	71	157	93	55
18	142	108	45	106	53	70	152	76	241	69	73	131
19	146	110	174	138	28	64	118	93	63	55	129	173

TABLE 18.—Per cent of normal rainfall of Chilgrove, England; Denmark; Sweden and Utrecht, Holland. Begins January, 1861.

Cycles.	Phase numbers.														
	(10)	(11)	(12)	(13)	(14)	(15)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1	39	88	98	96	126	141	80	79	162	42	90	44	92	82	102
2	130	71	75	130	65	102	104	68	77	82	79	92	80	145	70
3	68	98	50	81	125	54	70	122	40	90	134	56	91	31	107
4	98	58	20	102	54	135	135	160	23	138	84	40	135	198	84
5	96	100	108	110	110	88	188	26	139	110	148	124	73	(73)	148
6	72	109	109	157	59	110	110	94	60	88	88	112	112	112	131
7	115	115	52	32	32	40	110	110	100	104	62	62	189	78	137
8	137	62	50	201	92	92	47	84	131	106	106	112	107	98	62
9	77	47	47	73	57	74	(124)	84	130	130	113	106	62	78	101
10	140	140	69	130	140	39	156	56	42	64	145	94	126	118	105
11	94	80	158	146	155	144	134	80	60	64	134	92	83	92	138
12	88	49	94	56	90	128	78	70	156	111	95	97	148	57	66
13	72	117	97	73	98	98	42	156	118	74	50	131	68	114	172
14	125	102	60	130	88	162	94	62	108	156	71	112	92	(120)	65
15	145	94	116	152	150	108	73	43	93	127	54	74	117	148	44
16	130	150	136	49	162	103	38	110	96	131	110	89	98	104	76
17	80	111	153	100	174	140	112	86	135	130	102	78	98	49	76
18	81	147	170	122	98	161	(79)	136	136	96	91	53	86	72	121
19	48	88	88	95	58	141	72	117	58	59	59	142	70	24	148
20	122	132	132	65	45	170	170	42	79	72	126	126	66	91	46
21	46	46	81	79	172	230	230	30	56	99	96	96	37	64	64
22	118	118	92	86	102	52	52	81	158	92	82	82	137	200	84
23	56	56	88	100	82	40	106	106	86	90	125	68	130	(128)	100
24	137	62	70	136	82	127	171	106	111	156	126	43	118	132	30
25	70	132	68	136	102	122	173	75	109	99	142	98	68	53	67
26	70	151	68	98	128	139	66	80	78	177	52	14	60	59	125
27	72	128	142	96	102	132	(152)	106	120	97	162	114	86	103	113
28	105	69	139	102	60	82	160	122	102	148	114	70	28	172	63
29	109	68	95	203	131	61	116	70	101	170	115	90	76	149	127
30	44	63	133	110	111	90	188	153	120	86	98	64	119	139	107
31	63	170	94	48	74	72	160	89	98	108	197	52	110	78	121
32	85	122	54	130	94	134	66	120	156	66	147	78	68	(82)	88
33	112	92	68	111	60	144	90	166	60	82	60	80	100	105	126
34	194	113	110	120	159	160	93	64	128	162	75	116	151	88	37
35	93	68	76	93	108	63	60	164	123	62	120	78	138	97	119
36	108	35	200	133	100	74	(158)	77	58	78	48	90	143	86	78
37	93	78	136	124	164	84	88	36	112	78	123	81	121	117	106
38	123	89	102	119	76	38	78	78	61	47	163	141	94	105	112
39	108	156	66	166	124	182	59	150	90	109	118	109	67	60	176

40	122	59	126	113	76	86	149	39	87	47	148	169	162	98	121
41	166	66	98	167	82	229	77	99	107	157	102	147	101	(134)	100
42	87	53	55	94	118	104	66	125	231	103	82	73	126	52	91
43	66	109	193	155	155	167	87	79	146	68	149	80	73	52	125
44	224	123	147	128	123	125	148	57	124	70	131	115	132	81	30
Mean, 1–22	98	98	95	105	104	116	107	88	100	100	98	94	100	100	100
Mean, 23–44	100	89	101	117	100	107	109	93	104	98	113	85	98	94	93
Mean, 1–44	99	94	98	111	102	112	108	90	102	99	106	90	99	97	96

Means are adjusted to make their average 100.

TABLE 19.—Chile. Sums of rainfall in the following towns for years indicated: Concepcion, 1876-1887 and 1892-1915. Puerto Montt, 1862- April, 1873; 1888- July, 1895, and January, 1896-1915. Santiago, 1873-1915. Serena, 1869-1915. Valdivia, 1852-1879 and 1900-1915.

SUMS OF ACTUAL RAINFALL.

YEARS.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1852	.....	.....	.....	.....	.....	.....	.....	5150	2580	620	2330	970
53	110	1420	1300	1970	5550	7500	2770	1760	2490	1260	1520	120
54	250	540	1410	2500	5490	7650	5270	2690	1310	1920	750	630
55	970	90	2080	3550	1780	4600	4610	4650	1390	990	400	2310
56	1100	500	3050	1930	1410	8340	2640	2640	1320	430	1550	1250
57	2320	1270	1650	2570	4730	6350	4220	1320	1760	1510	3220	1240
58	370	2260	560	3830	3990	2940	2240	5110	1950	580	2170	120
59	120	360	1630	2900	4750	6480	4220	1730	1650	740	660	140
1860	170	1680	890	1130	3830	2840	8630	6330	3150	910	940	280
61	120	190	1560	5310	3600	4250	4340	2570	1270	1480	640	170
62	2120	340	2770	4490	8450	13030	7170	5790	2460	4820	5520	2630
63	1490	1050	3010	6080	3960	8690	4470	4670	2210	1460	2490	3880
64	1500	800	2060	2770	8670	7630	6280	6740	3880	3040	2590	4270
65	1150	190	1560	2940	9050	6480	7320	7740	4580	6170	2170	2780
66	960	980	7900	4500	8970	2320	7640	10060	3820	2210	3500	560
67	650	1680	2820	5420	10820	6020	5390	4590	3260	1670	2470	4350
68	4220	5170	2750	3910	8880	10070	8430	4560	6640	4120	2100	6830
69	2580	1550	3210	1620	4780	4400	8720	11280	3370	3170	3260	5220
1870	2920	2130	6130	4130	8400	4380	8650	3600	1520	1600	1520	4880
71	3280	600	6860	3960	4985	4075	5470	8140	2610	4170	1190	1830
72	2060	1510	2920	3290	3680	5140	4875	8125	4850	4480	4060	3840
73	1440	566	3610	4228	3726	5890	5340	3187	3312	900	130	2210
74	250	210	1094	570	2744	6827	3598	4288	2897	2060	2068	160
75	1656	1186	2710	1204	7176	1893	3658	1250	590	960	934	2340
76	408	1466	2712	2264	5432	4155	8848	5881	3380	4726	1054	80
77	148	1279	2472	6640	3601	4109	12422	4894	5872	3888	1698	742
78	228	424	2716	5502	8897	10554	6432	2431	5051	3418	2695	474
79	446	582	1020	2138	5275	9160	11084	9804	718	938	1058	3032
1880	496	182	235	548	1436	8676	9018	4423	582	1002	126	616
81	186	304	50	2195	3773	2554	3380	2142	2969	1317	688	40
82	222	332	733	536	2248	1796	4385	3698	1031	376	877	0
83	176	38	1392	407	3349	6316	1382	836	1354	884	758	0
84	42	24	797	2920	614	2247	1722	3673	1591	1012	237	832
85	844	428	302	734	3955	757	4295	2425	1491	897	166	510
86	60	190	852	470	1512	2808	1731	1368	813	371	381	590
87	50	185	80	253	910	6643	1855	6958	2280	933	738	291
88	170	1240	750	2392	3694	4130	4111	7073	3368	3289	1522	1610
89	655	510	1520	1590	3210	1733	3870	2870	1496	740	1163	1909
1890	2162	730	805	486	1783	2841	4592	1703	1796	1133	520	2262
91	2200	1290	1930	1520	2910	6227	4654	2859	2310	3405	987	320
92	1233	2641	1535	1047	3360	2822	4080	4087	2549	2069	733	1157
93	403[illegible]	590	2270	1555	5414	3405	6648	3792	978	963	1419	1615
94	1534	1230	2326	1098	4668	3182	5181	4161	2715	3462	3574	1553
95	987	989	3222	1605	2412	4219	6826	5739	1510	1204	533	918
96	1373	410	1471	781	1942	3484	8203	4561	7270	2919	2153	603
97	313	990	2847	4587	6666	4819	3713	3491	1511	2338	2235	1894
98	1175	4251	2108	5081	5616	10006	6377	2783	3051	1733	2441	3323
99	2321	1296	2981	4380	8812	7430	13519	13047	1293	1240	2450	1150
1900	2220	3532	8567	3451	10757	10533	22182	9368	6177	6168	4155	576
01	1166	3439	1657	3639	10459	16351	13035	11198	4860	2200	5324	1578
02	1383	3495	4529	6093	15927	15389	13753	5536	5657	2392	3450	1529
03	510	501	738	2154	2864	13472	3779	3697	3019	1355	909	1445
04	679	285	1094	4784	9731	10565	17881	5736	7179	3029	1557	2132
05	369	71	3581	4011	6925	12188	9646	8120	4234	3906	450	1460
06	1421	1137	1578	4438	9484	8481	6869	5618	3916	1346	223	955
07	916	1271	558	364	5215	9114	6817	6337	5171	2866	449	2171
08	102	609	3202	6184	8909	6913	2958	6908	3144	1968	1864	879
09	484	854	265	2737	2948	5655	2865	6751	1723	2055	1967	811
1910	2756	1951	564	3678	5324	13591	9993	12160	1934	1248	3094	120
11	1092	851	644	7038	10577	5191	6221	6948	3814	917	4497	2912
12	903	3579	1443	7136	9364	8967	5405	7820	1904	3716	3192	2242
13	129	1379	2177	8693	12355	5986	15961	6161	5289	2048	349	1526
14	3242	390	1740	2024	9691	17961	13405	6552	10493	3150	5615	1564
15	192	1772	1250	9038	17618	10368	11040	8119	3291	2923	2553	1991

TABLE 19—CONTINUED.

SUMS OF NORMAL RAINFALL FOR EACH MONTH WHERE ACTUAL RAINFALL HAS BEEN USED.

YEARS.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1852	.....	.....	.....	.....	.....	.....	.....	3365	2101	1417	1233	1047
53	634	738	1418	2376	3910	4457	4310	3365	2101	1417	1233	1047
54	634	738	1418	2376	3910	4457	4310	3365	2101	1417	1233	1047
55	634	738	1418	2276	3910	4457	4310	3365	2101	1417	1233	1047
56	634	738	1418	2376	3910	4457	4310	3365	2101	1417	1233	1047
57	634	738	1418	2376	3910	4457	4310	3365	2101	1417	1233	1047
58	634	738	1418	2376	3910	4457	4310	3365	2101	1417	1233	1047
59	634	738	1418	2376	3910	4457	4310	3365	2101	1417	1233	1047
1860	634	738	1418	2376	3910	4457	4310	3365	2101	1417	1233	1047
61	634	738	1418	2376	3910	4457	4310	3365	2101	1417	1233	1047
62	1846	1815	3005	4286	6788	6925	7213	5747	3748	2840	2686	2479
63	1846	1815	3005	4286	6788	6925	7213	5747	3748	2840	2686	2479
64	1846	1815	3005	4286	6788	6925	7213	5747	3748	2840	2686	2479
65	1846	1815	3005	4286	6788	6925	7213	5747	3748	2840	2686	2479
66	1846	1815	3005	4286	6788	6925	7213	5747	3748	2840	2686	2479
67	1846	1815	3005	4286	6788	6925	7213	5747	3748	2840	2686	2479
68	1846	1815	3005	4286	6788	6925	7213	5747	3748	2840	2686	2479
69	1847	1815	3013	4311	7001	7403	7554	6000	3815	2877	2693	2479
1870	1847	1815	3013	4311	7001	7403	7554	6000	3815	2877	2693	2479
71	1847	1815	3013	4311	7001	7403	7554	6000	3815	2877	2693	2479
72	1847	1815	3013	4311	7001	7403	7554	6000	3815	2877	2693	2479
73	1854	1831	3058	4466	4745	5770	5555	4239	2435	1608	1312	1105
74	642	754	1471	2556	4745	5770	5555	4239	2435	1608	1312	1105
75	642	754	1471	2556	4745	5770	5555	4239	2435	1608	1312	1105
76	819	981	2060	3436	6751	8318	8185	6131	3423	2220	1734	1368
77	819	981	2060	3436	6751	8318	8185	6131	3423	2220	1734	1368
78	819	981	2060	3436	6751	8318	8185	6131	3423	2220	1734	1368
79	819	981	2060	3436	6751	8318	8185	6131	3423	2220	1734	1368
1880	185	243	642	1060	2841	3861	3875	2766	1322	803	501	321
81	185	243	642	1060	2841	3861	3875	2766	1322	803	501	321
82	185	243	642	1060	2841	3861	3875	2766	1322	803	501	321
83	185	243	642	1060	2841	3861	3875	2766	1322	803	501	321
84	185	243	642	1060	2841	3861	3875	2766	1322	803	501	321
85	185	243	642	1060	2841	3861	3875	2766	1322	803	501	321
86	185	243	642	1060	2841	3861	3875	2766	1322	803	501	321
87	185	243	642	1060	2841	3861	3875	2766	1322	803	501	321
88	1220	1093	1640	2090	3713	3781	4148	3256	1981	1614	1532	1490
89	1220	1093	1640	2090	3713	3781	4148	3256	1981	1614	1532	1490
1890	1220	1093	1640	2090	3713	3781	4148	3256	1981	1614	1532	1490
91	1220	1093	1640	2090	3713	3781	4148	3256	1981	1614	1532	1490
92	1397	1320	2229	2970	5719	6329	6778	5149	2969	2226	1954	1753
93	1397	1320	2229	2970	5719	6329	6778	5149	2969	2226	1954	1753
94	1397	1320	2229	2970	5719	6329	6778	5149	2969	2226	1954	1753
95	1397	1320	2229	2970	5719	6329	6778	5149	2969	2226	1954	1753
96	1397	1320	2229	2970	5719	6329	6778	5149	2969	2226	1954	1753
97	1397	1320	2229	2970	5719	6329	6778	5149	2969	2226	1954	1753
98	1397	1320	2229	2970	5719	6329	6778	5149	2969	2226	1954	1753
99	1397	1320	2229	2970	5719	6329	6778	5149	2969	2226	1954	1753
1900	2031	2058	3647	5346	9629	10786	11088	8514	5070	3643	3187	2800
01	2031	2058	3647	5346	9629	10786	11088	8514	5070	3643	3187	2800
02	2031	2058	3647	5346	9629	10786	11088	8514	5070	3643	3187	2800
03	819	981	2060	3436	6751	8318	8185	6132	3423	2220	1734	1368
04	819	981	2060	3436	6751	8318	8185	6132	3423	2220	1734	1368
05	819	981	2060	3436	6751	8318	8185	6132	3423	2220	1734	1368
06	819	981	2060	3436	6751	8318	8185	6132	3423	2220	1734	1368
07	819	981	2060	3436	6751	8318	8185	6132	3423	2220	1734	1368
08	819	981	2060	3436	6751	8318	8185	6132	3423	2220	1734	1368
09	819	981	2060	3436	6751	8318	8185	6132	3423	2220	1734	1368
1910	2031	2058	3647	5346	9629	10786	11088	8514	5070	3643	3187	2800
11	2031	2058	3647	5346	9629	10786	11088	8514	5070	3643	3187	2800
12	2031	2058	3647	5346	9629	10786	11088	8514	5070	3643	3187	2800
13	2031	2058	3647	5346	9629	10786	11088	8514	5070	3643	3187	2800
14	2031	2058	3647	5346	9629	10786	11088	8514	5070	3643	3187	2800
15	819	2058	3647	5346	9629	10786	11088	8514	5070	3643	3187	2800

TABLE 20.—Chile. Table made from sums given in Table 19, beginning January, 1862.

SUMS OF ACTUAL RAINFALL.

Cycles.	Phase numbers.														
	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(1)	(2)	(3)	(4)
1	2120	3460	2770	4490	8450	10100	5790	2460	4820	5520	2630	1490	1050	3010	6080
2	3960	6580	4670	2210	1460	2490	3880	1500	800	2060	2770	8670	7630	6280	6740
3	3880	3040	2590	4270	1150	190	1560	2940	9050	6480	7320	7320	7740	4580	6170
4	2170	2780	960	980	7900	4500	8970	2320	7640	7640	10060	3820	2210	3500	560
5	650	1680	2820	(2820)	5420	10820	6020	6020	5390	4590	3260	3260	1670	2470	4350
6	4350	4220	4220	5170	2750	3910	3910	8880	10070	10070	8430	4560	4560	6640	4120
7	2100	2100	6830	2580	1550	1550	3210	1620	4780	4400	4400	8720	11280	3370	3170
8	3170	3260	5220	2920	2130	6130	4130	4130	8400	4380	8650	(3600)	1520	1600	1600
9	1520	4880	3280	600	6860	3960	3960	4985	4075	5470	8140	2610	4170	1190	1830
10	2060	1510	2920	3485	5140	4875	8125	4850	4480	4060	3840	1440	566	3610	4228
11	3726	5890	5340	3187	2106	130	2210	250	210	1094	1657	6827	3598	4288	2478
12	2068	160	1656	1186	1957	7176	2776	1250	590	960	1687	408	2589	2264	4794
13	8848	4630	4726	567	714	2472	5120	4109	8658	4880	1698	485	424	4109	8897
14	8493	3741	3418	(1584)	446	582	1579	5275	9160	10444	718	938	2045	496	182
15	235	992	8676	9018	4423	582	564	616	186	304	50	2195	3773	2554	2761
16	2969	1317	688	40	222	332	733	536	2248	1796	4385	3698	1031	376	877
17	0	176	38	900	3349	6316	1382	836	1354	884	758	(0)	42	42	24
18	797	2920	614	2247	1722	3673	1591	1591	1012	237	832	844	428	302	734
19	734	3955	757	4295	2425	1491	897	897	166	510	60	60	190	852	470
20	1512	1512	2808	1731	1368	813	813	371	381	590	50	50	185	80	253
21	910	910	6643	1855	6958	2280	2280	933	738	291	170	170	1240	750	2392
22	3694	3694	4130	4111	7073	3368	3368	3289	1522	1610	655	510	510	1520	1590
23	3210	1733	3870	(2870)	1496	740	1163	1909	2162	730	805	486	1783	2841	4592
24	1703	1796	1133	520	2262	1745	1930	1520	2910	6227	4654	2859	2310	3405	987
25	320	1233	2641	1535	1047	3360	2822	4080	4087	2549	2069	733	1157	4036	590
26	2270	1555	5414	3405	6648	3792	978	963	1419	1615	1534	(1230)	2326	1098	3925
27	5181	4141	2715	3462	3574	1553	988	3222	1605	2412	4219	6826	5739	1357	533
28	918	1373	410	1471	1362	3484	8203	4561	7270	2919	2153	603	313	990	3717
29	6666	4819	3713	3491	1511	2338	2235	1894	2713	2108	5081	5616	10006	6377	2783
30	3051	1733	2441	2822	1296	2981	4380	8812	7430	13519	13047	1293	1240	2450	1685
31	3532	8567	3451	10757	10533	22182	9368	6177	6168	4155	576	2302	1657	3639	10457
32	16351	13035	11198	(4860)	2200	3451	1383	3495	4529	6093	15927	14571	5536	5657	2392
33	3450	1529	510	501	738	2154	2864	13472	3779	3697	2187	909	1445	679	285
34	1094	4784	9731	10565	17881	5736	7179	3029	1557	2132	369	71	3581	4011	6925
35	12188	9646	8120	4234	3906	450	1460	1421	1137	1578	4438	(9484)	8481	6869	5618
36	3916	1346	223	955	916	1271	558	364	5215	9114	6817	6337	5171	2866	449
37	2171	102	609	3202	6184	8909	6913	2958	6908	3144	1968	1864	879	484	854
38	265	2737	2948	5655	4808	1723	2055	1967	811	2756	1951	564	3673	6234	13591

39	9993	12160	1934	1248	3094	120	1092	851	644	7038	10577	5191	6221	6948	3814
40	917	4497	2912	903	3579	1443	7136	9364	8967	5405	7820	1904	3716	3192	2242
41	754	2177	8693	(12355)	5986	15961	6161	5289	2048	349	1526	3242	390	1740	2024
42	9691	17961	13405	6552	10493	3150	5615	1564	192	192	1772	1250	9038	17618	10368
43	11040	8119	3291	2923	2553	1991	.....	.....	.....	.....	.....	.....	.....	.....	.....

SUMS OF NORMAL VALUES OF ALL STATIONS.

1	1846	1815	3005	4286	6788	7069	5747	3748	2840	2686	2479	1846	1815	3005	4286
2	6788	7069	5747	3748	2840	2686	2479	1846	1815	3005	4286	6788	6925	7213	5747
3	3748	2840	2686	2479	1846	1815	3005	4286	6788	6925	7213	7213	5747	3748	2840
4	2686	2479	1846	1815	3005	4286	6788	6925	7213	7213	5747	3748	2840	2686	2479
5	1846	1815	3005	(3005)	4286	6788	6925	6925	7213	5747	3748	3748	2840	2686	2479
6	2479	1846	1846	1815	3005	4286	4286	6788	6925	6925	7213	5747	5747	3748	2840
7	2686	2686	2479	1847	1815	1815	3013	4311	7001	7001	7403	7554	6000	3815	2877
8	2877	2693	2479	1847	1815	3013	4311	4311	7001	7403	7554	(6000)	3815	2877	2877
9	2693	2479	1847	1815	3013	4311	4311	7001	7403	7554	6000	3815	2877	2693	2479
10	1847	1815	3013	5665	7403	7554	6000	3815	2877	2693	2479	1854	1831	3058	4466
11	4745	5770	5555	4239	2022	1312	1105	642	754	1471	3650	5770	5555	4239	2022
12	1312	1105	642	754	2014	4745	5668	4239	2435	1608	1208	819	1520	3436	7534
13	8185	4777	2220	1551	900	2060	5094	8318	7158	2822	1734	1094	981	2748	6751
14	8252	4777	2220	(1551)	819	981	2748	6751	8318	7158	3423	2220	1551	185	243
15	642	1950	3861	3875	2766	1322	652	321	185	243	642	1060	2841	3861	3320
16	1322	803	501	321	185	243	602	1060	2841	3861	3875	2766	1322	803	501
17	321	185	243	851	2841	3861	3875	766	1322	803	501	(321	185	185	243
18	642	1060	2841	3861	3875	2766	1332	1332	803	501	321	185	243	642	1060
19	1060	2841	3861	3875	2766	1382	803	803	501	321	185	185	243	642	1060
20	2841	2841	3861	3878	2766	1322	1322	803	501	321	185	185	243	642	1060
21	2841	2841	3861	3878	2766	1322	1322	803	501	321	1220	1220	1093	1640	2090
22	3713	3713	3781	4148	3256	1981	1981	1614	1532	1490	1220	1093	1093	1640	2090
23	3713	3781	4148	(3256)	1981	1614	1532	1490	1220	1093	1640	2090	3713	3781	4148
24	3256	1981	1614	1532	1490	1156	1640	2090	3713	3781	4148	3256	1981	1614	1532
25	1490	1397	1320	2229	2970	5719	6329	6778	5149	2969	2226	1954	1753	1397	1320
26	2229	2970	5719	6329	6778	5149	2969	2226	1954	1753	1397	(1320)	2229	2970	6024
27	6778	5149	2969	2226	1954	1753	1358	2229	2970	5719	6329	6778	5149	2598	1959
28	1753	1397	1320	2229	4344	6329	6778	5149	2969	2226	1954	1753	1397	1320	2600
29	5719	6329	6778	5149	2969	2226	1954	1753	1358	2229	2970	5719	6329	6778	5149
30	2969	2226	1954	1575	1320	2229	2970	5719	6229	6778	5149	2969	2226	1954	1892
31	2058	3647	5346	9629	10786	11088	8514	5070	3643	3187	2800	2044	3647	5346	9629
32	10786	11088	8514	(5070)	3643	2994	2031	2058	3647	5346	9629	10937	8514	5070	3643
33	3187	2800	819	981	2060	3436	6751	8318	8185	6132	2822	1734	1368	819	981
34	2060	3436	6751	8318	8185	6132	3423	2220	1734	1368	819	981	2060	3436	6751
35	8318	8185	6132	3423	2220	1734	1368	819	981	2060	3436	(6751)	8318	8185	6132
36	3423	2220	1734	1368	819	981	2060	3436	6751	8318	8185	6132	3423	2220	1734
37	1368	819	981	2060	3436	6751	8318	8185	6132	3423	2220	1734	1368	819	981
38	2060	3436	6751	8318	7158	3423	2220	1734	1368	2031	2058	3647	5346	9629	10786
39	11088	8514	5070	3643	3187	2800	2031	2058	3647	5346	9629	10786	11088	8514	5070

TABLE 20—CONCLUDED.

SUMS OF NORMAL VALUES OF ALL STATIONS—Concluded.

CYCLES.	Phase numbers.														
	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(1)	(2)	(3)	(4)
40	3643	3187	2800	2031	2058	3647	5346	9629	10786	11088	8514	5070	3643	3187	2800
41	2044	3647	5346	(9629)	10786	11088	8514	5070	3643	3187	2800	2031	2058	3647	5346
42	9629	10786	11088	8514	5070	3643	3187	2800	819	819	2058	3647	5346	9629	10786
43	11088	8514	5070	3643	3187	2800	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sum actual, 1–23	63176	65140	79627	63116	77135	78480	74031	61667	87892	79000	73025	63161	60231	56724	68892
Sum normal, 1–23	69085	63981	65648	64351	64753	68482	74903	80899	85216	79167	73926	67321	61019	59974	65492
Quotient	90	101	120	97	118	114	98	75	102	99	99	91	98	93	104
Sum actual, 24–43	95471	103310	85492	81414	90571	87814	73320	75003	69389	77013	88686	66849	72879	78740	73227
Sum normal, 24–43	94966	91730	88076	87896	84420	85178	77761	77361	75677	77760	79143	79243	77242	79132	85125
Quotient	104	116	100	96	110	106	97	100	95	102	115	86	97	102	89
Sum actual, 1–43	158647	168450	165119	144630	167706	166294	147351	136670	157281	156013	161711	130010	133110	135464	142119
Sum normal, 1–43	164051	155711	153724	152247	149173	153660	152664	158260	160893	156927	153069	146564	138261	139106	150617
Quotient	98	107	106	96	113	109	98	87	99	100	107	90	97	98	95

Quotients are adjusted to make their mean 100.

TABLE 21.—South Australia. Table made from data of 50 stations in South Australia—given in "Meteorological Observations of the Adelaide Observatory, 1907." Table made from January, 1861, to December, 1907, inclusive.

MEAN ACTUAL RAINFALL IN HUNDREDTHS OF AN INCH.

Cycles.	Phase numbers.														
	(10)	(11)	(12)	(13)	(14)	(15)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1	70	73	183	463	330	417	197	199	63	405	33	51	44	167	440
2	347	327	200	122	68	30	92	48	138	60	530	340	402	237	400
3	101	110	100	44	6	155	227	282	260	399	142	199	25	44	2
4	27	86	86	348	174	407	407	188	210	54	26	61	64	54	68
5	80	426	214	357	357	283	220	289	120	11	28	136	60	(60)	210
6	205	228	228	447	147	460	460	314	50	44	44	146	146	7	109
7	191	191	112	456	456	316	218	218	264	128	88	88	35	67	107
8	107	141	90	222	256	256	119	161	138	162	162	177	46	296	2
9	7	190	190	202	420	254	(493)	290	396	396	87	137	113	148	83
10	72	72	290	329	311	222	184	130	315	161	207	42	100	192	333
11	503	229	130	192	252	68	107	150	97	287	272	196	207	247	191
12	99	43	151	15	151	215	226	257	338	214	46	52	50	138	140
13	374	348	361	117	199	222	23	67	206	178	252	148	159	74	106
14	406	298	146	130	238	48	16	80	220	109	345	168	136	(64)	7
15	22	116	374	160	266	228	143	178	41	73	248	244	228	191	290
16	254	129	42	201	22	34	114	240	450	182	149	126	65	49	27
17	3	35	175	227	185	295	284	91	183	121	42	21	89	132	521
18	342	306	287	211	144	139	(82)	180	150	13	157	142	399	400	88
19	189	302	302	142	53	134	59	139	69	133	133	171	330	190	232
20	176	116	116	23	127	93	93	38	11	128	109	109	69	288	434
21	174	174	215	103	73	52	52	51	44	160	236	236	496	298	195
22	255	255	218	230	102	56	56	17	48	42	222	222	311	370	178
23	144	144	35	44	47	199	54	54	58	687	331	466	141	(393)	236
24	270	160	32	198	102	67	127	176	430	450	394	200	248	234	38
25	36	68	140	64	178	275	186	150	240	101	138	96	39	64	142
26	172	226	238	304	254	349	90	141	26	2	38	275	571	369	220
27	272	346	151	146	52	52	(8)	174	198	206	367	318	180	340	20
28	269	53	140	349	82	281	389	277	108	40	92	178	50	92	213
29	267	207	164	98	39	31	138	49	81	66	216	193	241	345	210
30	74	46	4	54	44	252	223	426	469	234	110	159	97	70	115
31	89	137	226	342	84	124	199	98	150	67	14	207	281	206	331
32	146	412	184	84	56	61	46	50	198	121	401	246	155	(212)	221
33	64	39	73	132	26	88	249	151	157	188	50	283	78	131	146
34	276	162	329	260	248	184	264	120	209	95	49	140	216	300	280
35	198	78	204	66	11	118	34	21	307	395	343	382	182	205	218
36	25	7	7	28	232	70	(177)	432	371	300	320	166	247	87	9
37	22	44	298	175	238	300	263	118	145	182	85	.....	.....	.....	.....

1	84	60	139	257	304	284	257	192	106	90	84	60	98	180	257
2	294	257	206	179	106	90	84	60	98	180	257	294	257	206	179
3	106	90	84	60	98	180	257	304	284	257	206	179	106	90	84
4	60	98	180	257	304	284	284	257	206	179	106	90	84	60	98
5	180	257	304	284	284	257	206	179	106	90	84	60	98	(98)	180
6	257	304	304	284	257	206	206	179	106	90	90	84	84	60	98
7	180	180	257	304	304	284	257	257	206	179	106	106	90	84	60
8	60	98	180	257	304	304	284	257	206	179	179	106	90	84	60
9	98	180	180	257	304	284	(257)	206	179	179	106	90	84	60	98
10	180	180	257	304	284	257	206	179	106	90	84	60	98	218	304
11	284	257	206	179	106	90	84	60	98	180	257	304	284	257	192
12	106	90	84	60	98	218	304	284	257	192	106	90	84	60	98
13	218	294	257	206	179	98	84	79	180	280	284	232	179	98	72
14	98	218	294	257	192	106	87	60	139	257	294	232	179	(98)	84
15	60	139	257	304	270	206	179	98	84	60	98	218	304	284	257
16	206	142	90	84	60	98	180	257	304	270	206	179	106	90	84
17	60	98	180	257	304	284	257	206	179	106	90	84	60	139	257
18	304	284	257	206	179	106	(90)	84	84	60	98	180	257	304	284
19	257	206	206	179	106	90	84	60	98	180	180	257	304	284	257
20	206	179	179	106	90	84	84	60	98	180	257	257	304	284	257
21	206	206	179	106	90	84	84	60	98	180	257	257	304	284	257
22	206	206	179	106	90	84	84	60	98	180	257	257	304	284	257
23	206	206	179	106	90	84	60	60	98	180	257	304	284	(257)	206
24	179	106	90	84	60	98	180	257	304	284	257	206	179	106	90
25	72	98	180	257	304	284	257	206	179	106	90	84	60	98	180
26	257	304	284	257	206	179	106	90	84	60	98	180	257	304	284
27	257	206	179	106	90	84	(60)	98	180	280	284	257	206	179	106
28	90	72	98	180	257	304	284	257	192	106	90	84	60	98	218
29	304	284	257	206	179	106	90	84	60	139	257	304	284	257	206
30	179	106	90	72	98	180	257	304	284	257	206	179	106	87	60
31	98	180	257	304	284	257	206	179	106	87	60	98	180	257	304
32	284	257	206	179	106	90	72	98	180	257	304	284	257	(206)	179
33	98	84	60	98	180	257	294	257	206	179	106	90	84	60	98
34	180	257	304	284	257	192	106	90	84	60	98	180	257	304	284
35	257	206	179	106	90	84	60	98	180	257	304	284	257	206	179
36	106	90	84	60	98	180	(257)	304	284	257	206	179	106	90	84
37	60	98	180	257	304	284	257	206	179	106	90	.....	.....	.....	.....
Sum actual, 1–18	3210	3348	3359	4243	3984	4049	3612	3332	3639	2997	2859	2474	2368	2567	3124
Sum normal, 1–18	2835	3226	3716	3996	3937	3636	3563	3198	2928	2918	2735	2648	2542	2470	2746
Quotient	109	100	86	102	97	107	97	100	119	99	100	89	89	100	109
Sum actual, 19–37	3118	2976	3078	2842	2048	2786	2707	2687	3316	3497	3648	3997	3932	4194	3538
Sum normal, 19–37	3502	3351	3370	3053	2979	3005	2882	2828	2992	3335	3658	3741	3793	3645	3506
Quotient	92	92	94	96	72	96	97	98	114	106	103	110	107	118	104
Actual total	6328	6324	6437	7085	6032	6835	6319	6019	6955	6494	6507	6471	6300	6761	6662
Normal total	6337	6576	7086	7049	6916	6641	6445	6026	5920	6253	6393	6389	6335	6115	6252
Quotient	99	95	90	99	86	102	97	99	116	103	101	100	99	110	106

Quotients are adjusted to make their means 100.

TABLE 22.—Jamaica. Observed per cent of normal rainfall. Prepared from table given by W. H. Pickering in "The Relation of Prolonged Tropical Droughts to Sun Spots," in the *Monthly Weather Review* for October, 1920.

Years.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1870	102	158	96	61	190	55	92	84	109	165	163	136
71	59	58	71	76	71	30	80	51	77	88	77	83
72	77	103	95	45	57	37	61	77	62	60	41	93
73	207	71	170	25	55	40	54	111	145	85	46	115
74	88	80	19	96	116	61	54	141	93	115	136	49
75	66	24	80	67	94	57	82	75	103	55	30	133
76	154	29	51	102	88	83	172	74	70	112	117	113
77	152	43	167	64	165	99	99	26	68	44	100	155
78	162	102	87	15	53	101	123	158	101	111	96	190
79	72	193	202	159	100	162	94	180	100	158	69	35
1880	111	29	34	61	127	47	81	140	54	39	29	157
81	31	146	40	101	412	85	100	91	104	120	99	66
82	74	70	110	73	90	36	79	70	119	89	70	78
83	140	127	127	73	58	76	66	79	106	80	67	58
84	121	125	80	40	74	105	53	74	84	94	65	48
85	44	54	46	103	54	51	64	91	84	63	62	307
86	136	166	83	139	58	355	131	198	80	79	48	111
87	154	84	74	98	102	129	151	101	78	84	106	15
88	35	69	53	79	232	103	56	80	110	43	60	203
89	122	33	130	147	86	191	128	75	111	104	57	59
1890	133	106	182	74	61	63	105	101	89	70	85	106
91	88	82	26	186	135	151	117	109	86	152	100	101
92	102	50	70	62	94	112	93	112	121	120	130	71
93	88	118	60	119	119	110	192	99	108	102	132	212
94	52	92	103	128	183	59	125	61	95	123	66	129
95	34	182	68	134	108	56	105	119	93	118	101	75
96	134	177	133	80	109	74	106	69	112	75	60	111
97	23	28	57	155	119	75	125	96	137	190	75	72
98	45	143	139	89	183	116	137	101	96	102	62	54
99	101	103	117	105	46	71	82	62	101	235	196	145
1900	133	151	76	124	85	94	151	79	110	64	68	116
01	100	43	103	56	67	214	159	95	144	96	131	106
02	145	111	132	118	98	157	72	79	80	71	73	163
03	49	51	99	107	116	91	91	186	73	72	75	95
04	87	169	213	130	83	232	90	80	88	163	102	78
05	200	108	232	113	90	154	58	90	112	122	88	141
06	86	187	172	176	145	175	88	102	145	83	99	41
07	66	136	10	27	56	91	90	68	73	104	56	90
08	111	184	106	76	54	178	88	102	82	109	86	138
09	111	59	89	80	75	98	116	119	216	117	276	34
1910	135	80	138	78	57	88	117	110	118	145	100	238
11	111	52	63	88	113	57	68	64	78	82	64	167
12	112	85	152	48	50	37	90	93	85	81	350	69
13	93	41	118	174	88	58	94	80	94	69	113	68
14	68	75	127	104	73	80	62	62	51	63	127	98
15	162	105	100	192	70	182	122	206	225	106	144	119
16	91	191	83	178	170	97	159	202	104	160	233	32
17	81	119	78	155	80	127	110	110	209	68	123	97
18	23	123	182	139	137	77	76	106	74	89	66	91
19	160	91	60	163	159	53	91	52	84	76	67	127
1920	72	87	106	6	90	.....	.....	.....	.....	.....	.....	.....
Normals in inches,	3.92	2.75	3.21	4.56	9.13	6.53	4.75	6.82	7.38	10.16	7.64	5.07

Cycles.	Phase numbers.														
	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(1)	(2)	(3)	(4)	(5)	(6)	(7)
1	102	158	96	61	61	190	55	92	(84)	109	165	165	163	136	59
2	58	71	76	76	71	30	80	51	77	88	77	83	77	103	95
3	51	37	61	77	62	60	41	93	207	71	170	25	55	40	54
4	111	115	46	115	88	80	19	106	61	54	141	104	136	49	66
5	24	74	94	70	75	103	55	82	154	40	102	86	176	72	112
6	115	98	167	114	99	62	56	100	158	102	51	53	112	130	111
7	(143)	72	193	180	100	162	137	100	158	52	100	29	34	94	47
8	81	140	54	34	157	31	146	40	101	112	85	96	104	120	99
9	66	74	70	110	73	90	36	79	70	119	89	70	78	140	127
10	100	58	76	66	79	106	80	67	(58)	121	121	125	80	40	74
11	105	53	74	84	84	94	65	48	44	54	46	103	103	54	51
12	64	91	84	63	63	62	307	136	136	166	83	139	58	58	355
13	131	198	80	80	79	48	111	154	154	84	74	98	102	102	129
14	151	101	78	28	84	106	15	35	35	69	53	79	232	232	103
15	56	80	110	110	43	60	203	122	33	33	130	147	86	191	128
16	(75)	111	104	57	59	133	106	182	74	61	63	105	101	89	70
17	85	106	85	26	186	135	151	117	109	86	152	100	101	102	50
18	70	62	94	112	93	112	121	120	130	71	88	118	60	119	119
19	110	192	99	108	102	132	212	52	(92)	103	128	121	125	61	95
20	123	66	129	108	68	134	108	56	105	119	106	101	75	134	177
21	133	94	74	106	69	112	75	60	111	23	28	106	119	75	125
22	96	137	190	75	72	94	39	89	183	116	137	101	96	102	62
23	78	103	117	105	46	71	82	62	101	235	196	139	151	76	124
24	85	94	151	79	110	64	68	116	72	103	56	67	214	159	95
25	(144)	96	118	145	111	132	118	98	114	79	80	71	73	163	49
26	51	99	107	116	91	91	186	72	75	95	87	169	213	130	83
27	232	90	80	88	163	102	78	200	108	232	113	90	154	58	90
28	112	122	88	141	86	187	172	176	(145)	175	88	102	145	83	99
29	41	66	136	10	27	56	91	90	68	73	104	56	90	111	184
30	106	76	54	178	88	102	82	109	86	138	111	59	89	80	75
31	98	118	216	117	276	34	135	80	138	78	57	88	117	110	118
32	145	100	238	111	52	63	88	113	57	68	64	78	82	64	167
33	112	85	152	48	50	37	90	93	85	81	350	69	67	118	174
34	(88)	58	94	80	94	69	117	68	68	75	127	104	73	80	62
35	62	51	63	127	98	162	162	105	100	192	70	182	122	206	225
36	106	144	119	91	191	83	178	170	97	159	202	104	160	233	32
Mean, 1–18	93	99	96	88	91	97	104	101	107	87	104	101	108	109	108
Smoothed	100	96	94	92	92	97	101	104	98	99	97	104	106	108	103
Mean, 19–36	99	91	114	94	92	88	107	93	92	110	108	92	111	104	104
Smoothed	98	101	100	100	91	96	96	97	98	103	103	103	104	106	106
Mean, 1–36	96	95	105	91	92	92	106	97	100	98	106	96	110	106	106
Smoothed	99	99	97	96	92	97	98	101	98	101	100	104	104	107	103

TABLE 24.—Tananarive, Madagascar. Rainfall in mm.

Years.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
1890	18880	15270	12380	13100	0	1302	240	58	58	15403	23901	29955	129747
91	11700	23843	35133	4528	469	224	557	534	1982	28173	3635	18389	129167
92	36374	33996	3007	5064	574	665	442	1175	424	5611	7517	28113	122962
93	25853	24182	18607	10001	4131	1412	1460	887	237	8219	1616	50343	146948
94	47306	21811	22957	1844	3496	597	849	3307	6244	1902	10327	40132	160772
95	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
96	16820	41155	6490	12505	630	1040	100	933	393	7320	15605	15455	118446
97	46065	15095	27500	4480	1108	100	170	55	690	7770	7960	44647	155640
98	41699	11800	13820	2785	472	1009	535	1650	380	3263	7385	36816	121614
99	23470	30281	37733	12616	2783	232	802	1056	91	14746	14009	10116	147936
1900	41449	33277	14280	2060	310	82	439	1112	4128	2709	3249	15104	118199
01	41200	23627	22918	894	294	1213	162	799	386	991	4068	37217	133769
02	12200	30358	21516	9423	1431	420	364	113	2096	5506	11549	18439	113415
03	44565	23840	25840	1852	700	631	756	836	1190	7226	19729	24218	151383
04	31777	24842	17356	697	905	2548	943	1717	1271	2680	3262	36547	124545
05	40502	53237	11665	8039	1140	215	756	1901	2381	6829	31347	35541	193553
06	4945	66995	24004	13270	320	225	670	70	3220	13825	10090	24760	166494
07	19105	16710	34655	3765	0	1685	1790	105	5155	7055	16425	54770	161220
08	20940	47040	18115	3740	3245	114	859	0	720	5310	8172	45237	153492
09	13099	20183	1675	6120	600	480	25	3135	4565	4663	6102	8565	69212
1910	21162	22798	26092	180	11[illegible]	231	57	70	2[illegible]	1950	14984	31284	120576
11	32681	27787	25301	3828	1322	1426	703	667	481	1617	16374	13227	125474
12	23301	15071	12141	7299	189	485	934	110	2325	2443	943	25459	90700
13	49075	44162	6064	1928	3770	273	463	419	4953	5238	16571	24286	157202
14	61814	46426	7412	5354	833	130	1579	328	80	5648	11917	7549	149070
15	27781	27075	22142	8352	3200	309	113	212	214	2464	15922	15098	122882
16	29355	24652	21576	5774	3132	593	613	571	661	5185	39063	44902	176077
17	20533	23850	8596	6541	263	154	1077	2391	864	1662	17139	52281	135351
18	19572	15787	11486	2159	2007	928	600	315	359	1963	13011	26605	94792
19	27480	28110	24442	1018	1261	2057	402	313	2538	3590	11537	33782	136530
1920	38211	51067	8087	4344	692	720	1069	312	247	605	14821	10635	130810
21	58273	24303	11229	513	4077	179	462	508	104	2624	20389	37662	160323
Mean	305.28	293.10	178.80	53.45	14.02	6.99	6.45	8.27	15.34	61.03	128.58	289.40	1360.74

TABLE 25.—Tananarive, Madagascar, beginning January, 1890.

Cycles.	Phase numbers.														
	(13)	(14)	(15)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
1	18080	15270	12380	13100	0	1302	240	58	58	15403	23901	20828	23843	35133	4528
2	469	224	557	534	1982	28173	3635	18389	6374	33996	3007	5064	574	665	442
3	1175	424	5611	7517	28113	25853	24182	18607	10004	4131	1412	1460	887	237	8219
4	1616	50343	47306	(21811)	22957	2670	597	849	3307	6244	1902	10327	40132	.....	.....
5	.....	.....	.....	.....	.....	.....	.....	.....	16820	41155	9498	630	1040	100	933
6	393	7320	15605	15455	46065	21298	4480	1108	100	170	55	690	7770	7960	43173
7	11800	13820	2785	472	1009	535	1650	380	3263	22100	23470	30281	37733	12616	2783
8	233	802	1056	91	14746	12062	41449	33277	14280	2060	310	82	439	1112	4128
9	2709	3249	28151	23627	22918	894	294	1213	162	799	(386)	2580	37217	12200	30358
10	21516	9423	926	364	113	2096	5506	11549	18439	44565	23840	25840	1852	700	631
11	756	1013	7226	19729	24218	31777	24842	17356	697	905	2548	943	1717	1271	2680
12	3262	36547	40502	53237	11665	8039	1140	215	756	1901	2381	6829	31347	35541	4945
13	66995	24004	13270	(320)	225	670	70	3220	18825	10090	24760	19105	16710	34655	3765
14	0	1685	1790	105	5155	7055	16425	54770	20940	47040	18115	3740	3245	114	859
15	0	720	5310	8172	45237	13099	20183	1675	6120	600	252	3135	4565	4663	6102
16	8565	21162	22798	26092	1805	115	234	57	70	25	1950	14984	31284	32681	27787
17	25361	3828	1322	1426	703	667	481	1617	16374	13227	23301	15071	12141	7299	189
18	485	934	110	2325	2443	943	37367	44162	6064	1928	(3770)	273	463	419	4953
19	5238	16571	24286	61814	46426	7412	5354	833	130	1579	328	80	5648	11917	7549
20	27781	27781	27075	22142	8352	3200	309	113	212	214	26164	15922	15098	29355	24652
21	21576	5774	3132	593	613	571	661	5185	39063	44902	20533	23850	8596	8541	263

Normal Values in Hundredths of Mm.

1	30528	29310	17880	5345	1402	699	645	827	1534	6103	12858	29734	29310	17880	5345
2	1402	699	645	827	1534	6103	12858	28940	30528	29310	17880	5345	1402	699	645
3	827	1534	6103	12858	28940	30528	29310	17880	5345	1402	699	645	827	1534	6103
4	12858	28940	30528	(29310)	17880	3374	694	645	827	1534	6103	12858	28940	.....	.....
5	.....	.....	.....	.....	.....	.....	.....	.....	30528	29310	11612	1402	699	645	827
6	1534	6103	12858	28940	30528	23645	5345	1402	699	645	827	1534	6103	12858	29734
7	29310	17880	5345	1402	699	645	827	1534	6103	20899	30528	29310	17880	5345	1402
8	699	645	827	1534	6103	20899	30528	29310	17880	5345	1402	699	645	827	1534
9	6103	12858	29734	29310	17880	5345	1402	699	645	827	(1534)	6924	28940	30528	29310
10	17880	5345	1050	645	827	1534	6103	12858	28940	30528	29310	17880	5345	1402	699
11	645	1180	6103	12858	28940	30528	29310	17880	5345	1402	699	645	827	1534	6103
12	12558	28940	30528	29310	17880	5345	1402	699	645	827	1534	6103	12858	28940	30528
13	29310	17880	5345	(1402)	699	645	827	1534	6103	12858	28940	30528	29310	17880	5345
14	1402	699	645	827	1534	6103	12858	28940	30528	29310	17880	5345	1402	699	645
15	827	1534	6103	12858	28940	30528	29310	17880	5345	1402	672	827	1594	6103	12858
16	28940	30528	29310	17880	5345	1402	699	645	827	1534	6103	12858	28940	30528	29310

17	17880	5345	1402	699	645	827	1534	6103	12858	28940	50328	29310	17880	5345	1402
18	699	645	827	1534	6103	12858	29734	29310	17880	5345	(1402)	699	645	827	1534
19	6103	12858	28940	30528	29310	17880	5345	1402	699	645	827	1534	6103	12858	28940
20	30528	30528	29310	17880	5345	1402	699	645	827	1534	6103	12858	28940	30528	29310
21	17880	5345	1402	699	645	827	1534	6103	12858	28940	30528	29310	17880	5345	1402
Sum actual, 1–11	88747	101888	121603	102700	162123	126660	106875	102786	103501	171528	90630	98675	153204	71994	70575
Sum normal, 1–11	101786	104494	111073	123029	134733	123300	117027	111975	128374	127305	113452	107076	120918	67907	81702
Quotient	87	99	111	85	121	104	93	93	82	136	81	93	128	107	87
Smoothed	91	99	98	106	103	106	97	89	104	100	103	101	109	107	94
Sum actual, 12–21	129283	139006	139595	176226	122622	41771	82754	111847	109154	121506	97553	102989	129097	165185	108364
Sum normal, 12–21	146427	134302	133800	113588	96446	77817	83942	93261	88571	111335	144287	129272	145492	144398	141274
Quotient	88	103	103	153	126	53	97	119	122	108	67	79	88	114	76
Smoothed	89	98	120	127	111	92	90	113	116	99	85	78	94	93	93
Total sum, actual	218030	240894	261198	278926	284745	168431	189629	214633	212655	293034	188183	201664	282301	237179	178939
Total sum, normal	248213	238796	244873	236617	231179	201117	200969	205236	216944	238640	257739	236348	266410	212305	222976
Quotient	88	101	107	118	123	84	94	105	98	123	73	85	106	112	80
Smoothed	90	99	109	116	108	100	94	99	109	98	94	88	101	99	93

SUPPLEMENTARY TABLES.

Data collected during the investigation, but not used, published to make available for other problems. All this information was obtained in manuscript form with the exception of that from India, which was collected from the large annual volumes of "India Rainfall," 1901-1918.

SUPPLEMENTARY TABLE No. 1.—Showing total monthly and annual rainfall recorded at Alexandria and the normal for 1891-1920 in mm.

Years.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
1891	9	9	7	0	0	0	0	0	6	4	2	76	113
92	51	11	13	2	2	0	0	0	0	11	85	23	198
93	89	27	53	2	3	drops	0	0	drops	6	11	107	298
94	52	17	40	drops	6	0	0	0	0	0	102	30	247
95	1	0	4	16	0	0	0	0	0	0	46	100	167
96	69	45	19	2	0	0	0	0	1	1	41	27	205
97	126	12	14	0	0	0	0	0	0	14	1	107	274
98	57	4	1	0	0	0	0	0	0	0	60	144	266
99	73	23	2	0	0	0	0	0	0	58	25	64	245
1900	14	33	16	0	2	0	0	0	0	0	10	125	200
01	83	0	4	0	0	0	0	0	14	0	30	57	188
02	104	8	4	6	1	0	0	0	drops	5	36	92	256
03	90	34	14	1	drops	drops	0	drops	0	drops	10	24	173
04	63	12	drops	2	drops	0	0	1	drops	3	65	50	196
05	46	16	14	drops	0	0	0	0	0	28	7	159	270
06	32	43	6	3	9	drops	0	drops	0	19	64	31	207
07	25	13	38	7	0	0	0	2	drops	0	50	25	160
08	80	47	14	3	0	1	0	0	drops	0	39	76	260
09	43	41	0	51	drops	0	0	0	0	21	22	31	209
1910	86	8	19	2	3	0	0	drops	4	0	30	28	180
11	28	42	12	2	drops	0	0	0	drops	8	17	79	188
12	21	24	9	0	2	0	0	0	0	drops	10	27	93
13	12	36	21	drops	drops	0	drops	0	drops	14	79	98	260
14	28	31	7	8	0	drops	0	drops	drops	drops	29	103	206
15	19	19	19	1	drops	0	0	0	drops	0	14	10	82
16	109	14	8	2	drops	0	0	drops	drops	0	21	45	199
17	66	39	13	1	drops	0	0	0	drops	8	8	65	200
18	39	31	6	drops	0	0	0	0	0	drops	53	50	179
19	36	4	1	drops	drops	0	0	0	0	3	54	126	224
1920	35	42	11	drops	drops	drops	drops	0	0	0	6	39	133
Normal	53	24	13	4	1	0	0	0	1	7	34	67	204

Note.—"Drops" indicate that rain was too small to measure.

SUPPLEMENTARY TABLE No. 2.—Showing total monthly and annual rainfall recorded at Khartoum (Gordon College) and the normal for 1899-1920 in mm.

Years.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
1899	0	0	0	0	0	1	13	12	.....	6	0	0	[32]
1900	0	0	0	drops	0	23	80	47	23	8	drops	0	181
01	0	0	0	0	0	16	24	16	d ops	8	0	0	64
02	0	0	0	0	0	0	116	5	2	drops	0	0	123
03	0	0	0	0	24	0	18	12	14	drops	0	0	68
04	0	0	drops	0	drops	0	34	76	20	drops	0	0	130
05	0	0	drops	0	6	16	8	75	4	50	0	0	159
06	0	0	0	0	0	4	90	96	24	13	0	0	227
07	0	0	0	0	0	drops	14	163	12	0	0	0	189
08	0	0	drops	0	0	1	64	44	31	12	0	0	152
09	0	0	drops	drops	1	drops	71	26	11	3	0	0	112
1910	0	0	0	0	0	35	38	15	22	drops	0	0	110
11	0	0	0	0	7	drops	55	12	2	1	0	0	77
12	drops	0	drops	0	drop	drops	drops	98	18	0	0	0	116
13	0	0	0	drops	drops	0	7	70	22	2	0	0	101
14	0	0	drops	0	drops	1	30	54	11	5	0	0	101
15	0	0	0	0	9	8	19	63	77	0	0	0	176
16	0	0	0	drops	14	22	33	57	20	0	0	0	146
17	0	0	0	0	drops	34	0	24	18	0	0	0	76
18	0	0	0	0	drops	14	30	50	drops	drops	0	0	94
19	drops	0	0	drops	7	drops	38	23	7	drops	0	0	75
1920	0	0	drops	drops	4	0	103	185	49	drops	0	0	341
Normal	0	0	0	0	3	8	40	56	18	5	0	0	130

NOTE.—"Drops" indicate that rain was too small to measure. Brackets [ ] are used to denote that the observations are incomplete.

SUPPLEMENTARY TABLE No. 3.—Showing total monthly and annual rainfall recorded at Adis Ababa and the normal for 1898-1920 in mm.

Years.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
1898	8	15	105	73	41	121	352	290	151	18	10	0	1184
99	2	11	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1900	.....	.....	.....	.....	.....	[108]	283	328	194	0	13	5	[931]
01	16	54	124	100	36	222	277	250	128	21	0	13	1241
02	1	76	49	89	42	172	236	291	184	0	11	1	1152
03	29	25	83	88	268	191	269	267	224	20	0	8	1472
04	0	37	136	57	58	124	350	196	176	40	0	0	1170
05	5	7	48	88	41	94	294	352	113	1	45	0	1000
06	9	156	189	103	60	132	380	358	119	16	28	0	1550
07	0	20	11	140	36	61	176	284	108	14	83	drops	933
08	38	7	10	70	5	91	284	365	220	28	8	0	1126
09	48	0	18	133	130	208	210	364	174	0	10	drops	1295
1910	0	1	25	48	66	147	268	334	226	20	0	14	1149
11	7	4	67	38	31	140	306	230	155	46	64	0	1088
12	53	139	51	43	20	182	286	319	111	0	0	0	1204
13	0	65	66	102	108	104	192	311	134	0	0	0	1082
14	10	94	77	125	18	68	288	323	308	100	0	32	1443
15	2	23	105	126	133	121	345	378	570	59	27	11	1900
16	64	57	91	74	148	294	248	418	321	5	drops	7	1727
17	28	39	10	115	194	279	281	287	270	53	0	34	1590
18	0	84	70	104	74	106	208	264	51	drops	drops	0	961
19	11	47	66	32	43	90	316	253	133	0	0	0	991
1920	2	10	61	74	26	151	280	300	165	5	3	0	1077
Normal	15	48	70	87	75	146	279	307	192	20	14	6	1259

NOTE.—"Drops" indicate that rain was too small to measure. Brackets [ ] are used to denote that the observations are incomplete.

SUPPLEMENTARY TABLE No. 4.—Copenhagen. Rainfall in mm.

From Meteorological Institute, Copenhagen. Sent by Prof. Carl Ryder.

Years.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
1820	.....	.....	.....	.....	.....	.....	.....	.....	55	50	60	23	.....
21	64	5	22	25	74	4	21	31	63	42	81	67	499
22	44	17	63	15	3	2	138	116	41	28	33	12	512
23	39	85	33	44	36	76	66	45	50	32	45	69	620
24	26	26	43	27	40	38	34	76	53	56	150	119	688
25	40	45	23	100	41	70	27	99	83	51	131	40	750
26	10	71	41	44	7	22	41	25	34	87	54	51	487
27	97	5	93	45	55	39	56	48	40	53	40	70	641
28	28	32	64	54	24	54	145	88	70	38	38	58	693
29	22	90	21	27	34	43	126	81	61	107	83	7	702
1830	35	70	38	103	60	107	56	100	72	28	9	27	705
31	45	61	49	19	40	130	18	52	27	34	61	21	557
32	18	1	36	2	40	47	71	73	50	28	35	34	435
33	19	58	67	29	19	61	30	87	43	73	50	204	740
34	79	29	40	14	39	29	3	43	68	49	78	32	503
35	23	56	24	55	82	15	2	40	56	45	43	29	470
36	103	53	67	31	15	27	91	30	70	32	62	70	651
37	15	50	33	36	38	28	30	57	54	32	51	31	451
38	38	12	59	93	20	30	44	133	33	53	25	16	533
39	48	22	13	43	43	56	55	36	73	10	43	27	469
1840	74	29	5	5	60	31	63	66	59	58	54	13	517
41	71	11	25	29	30	99	96	48	76	171	62	51	769
42	17	0	66	0	24	94	36	3	58	26	48	27	399
43	125	61	18	50	14	104	69	47	26	100	54	17	685
44	121	61	44	15	21	34	54	123	27	90	57	17	664
45	35	21	34	17	122	16	75	105	63	104	49	83	724
46	58	55	83	37	22	28	74	22	12	34	26	36	487
47	32	37	39	43	62	51	39	26	66	34	24	16	467
48	9	55	38	63	10	97	38	110	36	104	56	19	635
49	50	44	34	19	9	104	121	45	48	95	27	35	631
1850	17	53	12	54	38	37	117	61	57	54	79	21	600
51	32	30	63	86	48	68	46	28	27	45	85	14	572
52	55	62	11	22	52	80	5	68	69	74	101	81	680
53	56	42	22	51	36	37	75	64	46	34	17	7	487
54	45	30	20	21	47	46	27	134	67	39	36	70	582
55	30	8	35	41	60	55	74	76	30	80	6	35	530
56	44	41	3	66	49	57	63	40	57	23	67	64	574
57	40	18	32	57	10	15	32	43	28	38	27	19	359
58	29	9	19	17	93	27	51	55	14	31	23	35	403
59	29	57	38	52	13	51	34	52	107	45	61	65	604
1860	34	36	33	51	40	93	23	132	51	55	24	25	597
61	20	48	62	13	28	76	106	51	73	6	84	29	596
62	34	24	24	20	28	86	80	34	89	79	31	68	597
63	42	35	49	47	25	60	65	64	75	27	23	78	590
64	23	23	47	15	28	119	43	152	86	41	61	6	644
65	28	12	13	7	16	29	55	57	31	56	48	4	356
66	44	93	32	72	91	44	53	77	65	26	77	55	729
67	68	68	16	74	48	55	125	18	76	65	54	34	701
68	27	53	58	52	7	3	8	60	64	61	25	100	518
69	25	30	14	10	74	32	23	63	42	59	37	32	441
1870	32	6	9	16	19	33	12	60	65	99	47	33	431
71	84	21	19	21	16	75	80	26	84	16	25	20	487
72	35	18	57	45	86	51	61	30	89	90	56	64	682
73	36	11	9	28	73	56	114	84	69	99	55	33	667
74	40	7	45	31	15	25	87	68	67	33	60	43	521
75	66	2	31	10	24	68	50	46	38	62	72	18	482
76	12	51	69	29	40	54	45	34	76	34	21	50	515
77	79	54	24	19	44	39	100	123	43	70	40	38	673
78	48	15	36	21	57	58	35	46	49	41	93	29	528
79	17	42	8	49	39	57	108	111	29	40	17	5	522
1880	8	41	14	31	13	41	92	8	59	123	105	53	588
81	6	20	26	3	47	20	93	66	72	61	52	35	501
82	24	16	45	40	18	81	46	88	46	53	67	29	553
83	22	10	5	17	22	37	87	55	54	67	84	46	506
84	78	49	49	19	30	27	75	44	35	102	36	55	599
85	3	36	22	17	49	78	15	83	92	99	18	20	552
86	40	7	16	28	37	42	50	29	46	73	24	59	451
87	5	10	23	41	69	24	44	43	52	49	45	54	459
88	29	26	71	19	44	54	96	48	22	43	45	56	553
89	15	31	26	34	43	25	60	107	88	72	15	14	530

TABLE 4—CONCLUDED.

YEARS.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
1890	42	3	31	47	23	45	91	93	15	74	33	2	499
91	36	13	51	21	73	69	97	170	42	61	38	60	731
92	56	12	25	37	36	89	26	94	50	90	7	37	559
93	22	72	30	6	32	19	51	57	68	141	63	38	599
94	34	50	40	62	46	34	136	65	35	93	42	34	671
95	17	11	40	16	38	48	86	87	14	63	78	66	564
96	22	8	78	42	30	42	32	81	100	84	31	40	590
97	9	12	93	52	47	33	43	68	94	9	32	41	533
98	46	42	46	51	101	96	59	51	67	11	39	76	685
99	68	38	37	54	23	15	32	16	97	43	55	39	517
1900	54	45	27	29	27	34	93	69	63	132	36	71	680
01	29	13	49	56	44	150	27	52	36	23	74	62	615
02	48	11	56	18	86	36	51	69	39	43	5	52	514
03	47	48	18	74	10	60	54	90	61	133	61	20	676
04	37	44	38	53	66	42	23	36	12	51	78	50	530
05	32	40	47	64	14	47	56	170	64	78	30	7	649
06	62	41	34	21	30	52	43	85	44	32	80	26	550
07	32	25	25	35	45	90	65	63	10	20	40	86	536
08	23	50	34	52	80	56	50	72	61	9	34	20	541
09	33	19	31	39	32	64	46	40	45	46	62	87	544
1910	54	93	12	54	61	40	89	64	46	14	76	57	660
11	22	64	31	35	58	70	57	38	21	85	78	58	617
12	28	34	41	39	27	49	46	135	28	67	73	93	660
13	26	21	44	20	13	28	50	56	51	62	76	76	523
14	31	34	80	60	30	15	77	39	57	35	57	67	582
15	66	35	23	32	42	10	72	43	36	16	38	109	522
16	87	38	25	38	37	86	43	128	45	77	61	92	737
17	45	9	34	41	10	19	40	88	50	111	95	22	564
18	29	41	3	28	18	47	88	76	67	32	25	77	531
19	38	32	29	53	7	40	60	57	48	31	40	90	525
1920	60	28	19	102	100	38	81	95	34	2	10	54	623
21	77	15	20	22	34	48	36	101	35	53	51	.....	.....
Means	40.6	34.2	35.8	37.4	39.7	51.1	60.0	67.7	54.3	58.4	51.1	46.2	576.5

SUPPLEMENTARY TABLE No. 5.—Rainfall of agricultural districts of the state of South Australia. All stations used.

YEARS.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
1908	50	47	123	64	246	269	99	198	263	215	32	42	1648
09	47	34	51	168	247	266	258	379	108	145	100	27	1830
1910	43	18	276	18	330	231	328	154	268	158	119	73	2016
11	29	192	56	27	208	208	174	135	171	69	21	159	1449
12	03	68	122	46	41	268	206	172	210	105	163	79	1483
13	13	129	173	42	(90)	33	94	182	215	182	83	98	1334
14	31	28	98	132	106	61	105	26	49	51	147	98	932
1915	42	19	20	119	188	268	186	290	239	80	21	34	1506
16	50	12	25	75	115	414	343	277	202	176	195	88	1972
17	123	149	105	47	301	245	314	249	282	187	101	89	2192
18	34	22	53	90	200	186	160	240	40	157	19	38	1239
19	30	237	22	56	153	106	109	129	169	95	39	148	1293
1920	32	04	44	76	158	375	197	281	231	158	218	94	1868
Means	.41	.74	.90	.74	1.83	2.25	1.98	2.09	1.88	1.37	.97	.82	.....

CORRELATION OF OLD AND NEW METEOROLOGICAL DISTRICTS OF INDIA.

Old No.	Old Name.	New No.*	Old No.	Old Name.	New No.*
1	Tenasserim	2	31	N. W Frontier Province	14
2	Lower Burma, Deltaic	2	32	West Punjab	12
3	Central Burma, Deltaic	2	33	Malabar	30
4	Upper Burma, Deltaic	3	33a	Travancore	30
5	Arakan	3	34	Madras, South Central	31
6	East Bengal	5	35	Coorg	29
7	Assam Surma	4	36	Mysore	29
8	Assam Hills	4	37	Konkan	25
9	Assam Brahmaputra	4	38	Bombay, Deccan	26
10	Deltaic Bengal	5	39	Hyderabad, North	28
11	Central Bengal	5	40	Kkandesh	26
12	North Bengal	5	41	Berar	22
13	Bengal Hills	5	42	Central Province, West	23
14	Orissa	6	43	Central Province, Central	23
15	Chota Nagpur	7	44	Central Province, East	24
16	South Bihar	8	45	Gujarat	19
17	North Bihar	8	46	Kathiawar and Cutch	19
18	United Provinces, East	9	47	Sind	16
19	South Oudh	9	48	Baluchistan Hills	15
20	North Oudh	9	49	Central India, East	20
21	United Provinces, Central	10	49a	Central India, East	21
22	United Provinces, West	10	50	Rajputana, E. Central India W	18
23	United Provinces, East Sub	9	51	West Rajputana	17
24	United Provinces, West Sub	10	52	Madras, East Coast North	33
25	United Provinces, Hills	10	52a	Madras, East Coast North	33
26	Southeast Punjab	11	53	Hyderabad, South	28
27	South Punjab	11	54	Madras Central	32
28	Central Punjab	12	55	Madras, East Coast Central	33
29	Punjab, Submontane	11	56	Madras, East Coast South	31
30	Punjab Hills	13	57	Madras, South	31
31	North Punjab	14			

*New number, as used in these tables and "India Rainfall." Names of each district will be found at head of its part of table.

SUPPLEMENTARY TABLE No. 6.—The rainfall of the thirty-three districts of India, in inches, 1901-1918.

No. 1.—Bay Isles.

Years.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1907	322	0	345	43	1329	970	1397	1457	546	1061	1885	1198
08	41	168	0	70	1504	2327	1525	2246	1260	625	475	5
09	5	211	137	395	1324	1794	1901	1027	1469	1453	852	733
1910	53	45	453	356	612	1267	1025	1007	2197	1064	677	361
11	14	17	0	348	859	1679	1125	713	2216	1023	193	513
12	1925	1	0	43	629	2206	1726	1167	1221	981	457	55
13	171	1	3	5	559	1724	1375	731	1489	1123	847	572
14	0	0	0	85	895	1576	2182	1619	1119	353	667	793
15	89	111	65	81	917	999	1077	917	1311	1266	826	1083
16	0	0	0	2	1919	1772	1249	1673	1629	1187	649	401
17	24	7	273	9	976	938	1208	1352	1373	665	671	792
18	125	9	17	33	1715	1549	592	1462	839	585	.....	.....

TABLE 6—CONTINUED.

No. 2.—LOWER BURMA.

YEARS.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1901	0	196	22	46	859	2059	2400	3951	1438	1240	165	7
02	.....	29	39	80	1809	1987	2938	2130	1925	419	47	67
03	0	.....	6	41	931	2264	2691	2408	1884	998	196	28
04	0	16	50	349	1083	3055	3244	2612	3039	396	552	21
05	2	15	20	10	1234	2933	3148	2134	2049	710	73	66
06	22	0	3	38	1148	2063	2571	1494	2047	667	220	3
07	35	3	204	28	1785	2649	2541	3600	1677	1017	73	151
08	3	2	14	101	1013	2769	2795	3113	1399	840	705	1
09	4	42	44	100	1324	2512	3452	2364	1960	926	514	16
1910	12	35	338	299	1627	1719	1830	2701	2215	697	299	9
11	5	6	20	392	950	2765	2950	3258	1561	908	13	3
12	122	6	10	45	1439	2326	2866	2656	1437	749	322	5
13	8	14	47	2	952	2270	3271	2817	1657	654	778	6
14	2	9	6	153	1001	3237	4027	3186	1278	724	282	187
15	21	8	42	146	1771	2306	3066	2687	1400	1201	216	319
16	0	3	15	114	1114	3635	1768	2435	2135	795	500	47
17	10	11	100	92	771	2988	3110	2462	1953	1223	197	66
18	12	0	48	127	2700	2524	2766	3343	2349	620	.....	.....

No. 3.—UPPER BURMA.

1901	6	80	4	50	718	2316	2504	2610	1724	978	248	20
02	.....	4	4	170	685	2178	3750	1615	1606	434	20	8
03	4	.....	36	16	608	2116	1850	2815	1594	933	334	2
04	0	10	9	358	706	3056	3358	2211	1392	338	514	26
05	9	30	256	76	1004	2267	3352	2656	1760	658	34	146
06	6	54	8	32	852	2674	2802	1524	1713	568	102	4
07	38	4	83	64	498	558	434	534	581	460	9	126
08	17	3	6	88	467	644	529	857	635	328	834	0
09	5	3	1	167	763	653	697	888	592	601	284	67
1910	6	15	114	290	716	682	624	659	857	710	176	0
11	14	3	41	347	579	877	555	646	680	564	23	1
12	12	9	19	74	553	751	648	914	598	652	127	10
13	9	19	39	31	413	770	722	813	649	655	206	21
14	1	15	17	92	656	1200	691	698	656	593	135	200
15	1	11	63	139	1037	890	661	661	641	533	125	100
16	5	8	4	126	442	811	719	926	963	624	307	63
17	2	57	8	126	399	787	450	1023	1008	723	226	4
18	3	2	35	110	1033	624	583	827	680	528	.....	.....

No. 4.—ASSAM.

1901	68	52	115	1039	726	2125	1779	2005	1335	819	413	3
02	32	36	377	1475	149	2397	2184	2130	1652	363	35	8
03	47	100	426	574	847	2564	1855	2525	1398	683	294	3
04	41	251	235	2020	1467	1785	2292	1916	1138	475	268	17
05	51	82	760	842	1070	3308	2090	2839	1279	1251	25	100
06	36	254	339	1235	1304	1743	2416	2710	1295	643	185	4
07	236	128	364	1028	799	1928	2155	1221	1585	170	17	50
08	70	144	106	776	1217	1472	1880	1396	1459	401	30	0
09	87	33	16	803	1196	2154	1331	1742	915	499	111	39
1910	47	110	541	789	985	2147	2374	1530	993	933	49	22
11	304	81	358	917	1714	1858	2293	1600	1530	943	103	13
12	40	241	481	1194	943	1685	2065	1664	952	643	188	32
13	53	338	476	1321	1443	1724	1767	1403	1019	822	48	175
14	26	322	309	854	1087	1175	1520	1826	1215	279	39	51
15	34	204	293	792	2309	1852	2468	1815	997	411	40	16
16	77	118	437	921	1117	1337	1816	1614	1197	899	120	23
17	47	381	128	723	715	2109	1838	1383	1313	715	138	6
18	16	65	563	622	1109	2200	2649	2108	1386	283	.....	.....

TABLE 6—CONTINUED.

No. 5.—BENGAL.

YEARS.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1901	91	94	48	260	646	1547	1646	1392	1169	285	252	10
02	4	4	242	642	913	1442	2060	1524	1914	275	24	10
03	44	82	162	97	512	1667	1076	1836	1226	656	54	0
04	18	97	76	433	1154	781	1882	1346	820	374	65	5
05	78	140	380	422	938	967	2137	2186	1540	546	2	51
06	88	320	180	68	657	1190	1866	2149	1000	538	67	0
07	6	83	322	348	612	1358	1549	927	979	124	4	58
08	80	58	32	160	662	1408	1546	882	938	152	36	0
09	22	21	3	558	596	1904	1052	2380	972	532	72	78
1910	60	44	112	241	687	1544	1908	1388	961	734	13	0
11	37	10	186	338	1052	1686	1410	1286	1138	608	45	0
12	6	64	306	624	784	1384	1688	1365	771	619	365	0
13	4	283	113	160	1017	2477	1473	1451	1147	618	80	73
14	1	212	101	534	1031	885	1655	1388	885	147	12	88
15	17	81	325	247	1115	1607	1427	1537	1023	527	100	0
16	5	44	18	587	388	1798	1478	1708	1441	1165	191	1
17	2	122	71	312	701	1572	1651	1192	1020	1357	52	0
18	3	1	160	411	1062	2045	1475	1970	963	108	.....	.....

No. 6.—ORISSA.

1901	180	254	44	173	298	309	1258	1002	837	346	549	0
02	23	1	92	313	322	515	1952	1264	679	119	22	170
03	34	106	69	83	254	641	1410	1116	1124	1117	122	6
04	1	49	86	19	361	1192	1010	1216	917	434	2	16
05	123	61	300	195	429	375	1057	787	1087	292	2	3
06	113	389	132	12	241	804	1152	825	1041	501	40	25
07	1	95	224	456	208	941	689	2354	648	103	13	96
08	144	4	63	23	193	1139	1212	1974	799	191	0	0
09	24	64	16	520	247	1184	1570	962	980	173	2	228
1910	67	4	9	148	257	932	1318	1211	1042	940	0	0
11	0	38	135	128	234	1350	621	1110	988	356	24	1
12	4	229	109	198	150	480	1368	1384	812	319	354	0
13	7	249	65	28	427	1056	2010	1126	581	458	110	6
14	0	134	49	213	772	860	1569	1072	1418	66	0	27
15	54	95	173	98	289	624	934	1060	1066	645	843	0
16	0	19	2	77	180	1458	883	1193	718	975	261	0
17	1	385	123	83	457	1292	1226	1263	958	1517	67	0
18	19	1	85	126	514	1336	694	1102	722	20	.....	.....

No. 7.—CHOTA NAGPUR.

1901	359	282	45	62	145	293	1018	1623	1050	129	39	0
02	19	40	51	95	231	308	1721	833	1185	54	31	14
03	87	66	38	129	229	533	874	1112	831	886	3	0
04	5	71	168	37	454	1263	1963	1502	405	106	6	1
05	171	217	200	147	230	158	1784	962	1360	83	0	11
06	188	533	141	5	107	644	1461	937	749	307	30	6
07	9	227	313	95	74	1289	742	1917	875	2	0	108
08	65	160	17	1	186	813	1316	1451	610	108	0	1
09	114	47	5	332	109	1067	1055	1415	1218	84	0	61
1910	85	29	15	136	177	954	977	1101	969	320	25	0
11	5	0	123	29	141	1482	602	1544	1028	336	163	0
12	11	97	82	95	135	466	1430	1396	450	92	227	0
13	11	527	187	4	286	1425	1289	1498	650	316	80	51
14	0	85	97	80	514	408	1129	1258	631	80	0	29
15	39	155	106	35	184	433	973	820	800	207	178	0
16	0	64	1	67	86	1006	841	1173	785	923	67	0
17	6	170	64	28	375	1155	1272	1645	900	1016	4	4
18	16	4	16	47	251	1253	500	1526	680	0	.....	

TABLE 6—CONTINUED.

No. 8.—BIHAR.

YEARS.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1901	220	79	46	5	243	264	864	1230	562	32	28	0
02	12	2	96	64	224	433	1375	842	1331	106	4	9
03	18	21	8	15	78	678	364	1240	664	567	0	0
04	34	8	12	14	446	697	1599	1416	313	394	37	10
05	58	112	132	88	303	178	1566	1928	1398	42	0	2
06	59	224	34	4	165	730	1388	1602	462	132	1	0
07	5	236	152	83	134	894	966	929	871	12	0	7
08	60	161	23	7	133	337	737	644	591	85	0	1
09	24	26	0	270	91	1666	1049	1361	699	132	0	19
1910	10	18	21	41	190	971	1273	1368	982	317	100	0
11	31	0	86	52	167	1313	719	1683	1240	532	71	0
12	19	19	98	101	250	559	1382	1203	379	42	289	0
13	0	148	78	5	407	1542	992	1414	1028	274	15	140
14	0	84	33	127	396	375	1163	1812	398	38	0	4
15	31	195	106	23	378	575	1194	1492	737	276	154	3
16	1	63	0	90	71	1112	1554	1284	1088	602	10	0
17	11	75	37	27	432	928	1338	878	1078	561	0	1
18	25	0	8	106	356	957	885	1990	937	29	.....	.....

No. 9.—UNITED PROVINCES, EAST.

1901	245	125	36	4	61	186	862	1064	2434	19	0	6
02	16	6	10	10	94	133	1676	626	1011	54	3	0
03	30	1	4	2	55	202	628	1690	1065	1323	0	10
04	32	6	24	1	104	587	1350	1236	343	248	67	101
05	57	90	82	19	70	63	1294	1342	687	18	0	6
06	22	226	23	0	58	534	1366	1171	437	23	0	0
07	7	292	60	72	35	162	707	1164	73	0	0	0
08	75	1	22	6	18	206	1022	1254	295	38	0	2
09	33	23	0	259	20	930	1588	719	524	23	0	85
1910	16	1	1	5	92	605	774	1295	860	377	123	0
11	168	0	117	8	12	380	321	1149	1555	334	148	1
12	57	20	23	17	57	188	1279	1046	540	4	110	3
13	1	138	122	2	242	627	783	703	328	47	0	46
14	5	54	76	38	179	140	1642	1262	389	13	3	1
15	46	167	90	23	56	418	1091	1628	1439	383	4	7
16	0	72	0	24	26	1043	1129	1467	711	216	29	0
17	28	105	26	13	163	628	1324	918	1190	221	0	19
18	1	1	19	13	60	493	380	1006	355	0	.....	.....

No. 10.—UNITED PROVINCES, WEST.

1901	278	162	67	4	81	102	783	1800	414	42	0	49
02	11	24	31	64	105	254	1473	917	1364	56	3	0
03	104	8	63	10	62	194	658	1349	740	594	0	17
04	63	6	160	12	144	410	1515	1439	501	18	87	70
05	206	168	125	30	85	178	778	703	414	1	2	28
06	37	367	92	8	55	794	1130	1020	732	14	0	31
07	83	287	103	114	56	68	774	1083	9	0	0	0
08	102	87	5	11	60	223	1414	1685	138	1	4	8
09	80	35	0	275	14	702	1534	957	452	5	0	148
1910	62	18	0	8	58	379	755	1379	893	690	16	1
11	329	6	182	7	3	315	263	643	1306	62	193	2
12	144	35	48	21	28	132	991	1067	981	0	31	7
13	2	188	124	7	229	572	611	457	84	11	6	39
14	0	63	101	88	135	241	1369	860	1051	56	25	0
15	103	274	222	33	58	239	954	1184	589	49	0	11
16	2	77	0	13	49	621	1362	1414	981	240	14	0
17	37	117	62	96	204	466	1428	1017	1281	357	0	25
18	36	2	64	46	34	470	409	723	115	2	.....	.....

TABLE 6—CONTINUED.

No. 11.—PUNJAB, EAST AND NORTH.

YEARS.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1901	194	142	76	2	66	52	628	612	77	10	0	15
02	0	3	37	39	91	245	593	415	254	34	9	0
03	91	3	120	6	52	29	744	548	426	27	0	29
04	92	6	296	6	93	94	395	624	351	21	47	53
05	205	99	97	8	29	81	443	163	429	3	0	38
06	25	320	170	9	12	207	478	607	755	2	0	27
07	109	330	191	200	27	120	319	819	21	2	0	0
08	162	54	2	130	52	60	869	1622	257	5	7	21
09	84	98	9	232	11	359	902	658	638	12	0	176
1910	125	32	9	28	12	363	567	944	346	189	0	16
11	396	29	425	19	7	237	124	351	403	44	127	2
12	209	35	43	80	30	61	671	790	250	1	46	9
13	8	213	142	7	226	386	511	624	80	7	8	59
14	57	140	65	179	95	205	1240	368	608	146	36	50
15	93	238	228	62	24	116	260	373	369	72	0	12
16	7	86	21	20	54	219	914	907	332	127	0	2
17	31	13	40	213	134	345	714	992	1259	402	0	44
18	26	4	224	157	5	131	151	518	55	3	.....	.....

No. 12.—PUNJAB, SOUTHWEST.

1901	108	58	68	36	200	59	372	184	72	2	0	0
02	0	4	39	30	63	202	268	262	171	27	0	0
03	36	2	135	26	85	27	509	354	202	10	1	18
04	188	2	366	2	26	49	108	234	42	6	40	38
05	182	98	82	14	16	48	338	37	471	8	3	82
06	5	360	112	13	10	98	190	404	309	1	0	52
07	17	108	69	163	32	134	117	320	2	0	0	0
08	90	21	2	144	45	35	421	609	418	0	0	3
09	9	66	14	138	1	126	449	67	180	1	0	100
1910	70	5	10	82	9	144	203	389	2	4	0	8
11	131	23	324	34	14	149	37	79	40	53	42	2
12	168	6	16	122	26	38	226	168	69	4	0	8
13	0	124	66	13	43	125	300	493	57	6	8	24
14	66	133	57	154	43	118	748	236	141	93	45	33
15	8	45	112	71	15	79	57	68	16	17	0	7
16	6	27	22	28	60	92	288	579	82	51	0	0
17	13	0	44	96	116	129	237	883	609	1	0	16
18	4	8	178	126	1	27	127	97	77	10	.....	.....

No. 13.—KASHMIR.

1901	589	725	315	61	335	152	1335	2363	277	19	0	65
02	23	72	382	291	232	354	1138	917	563	92	17	0
03	344	85	656	73	227	171	959	1851	694	34	0	263
04	333	97	557	111	250	191	1712	1297	302	142	79	171
05	438	448	607	95	208	206	1308	1034	229	2	2	139
06	209	747	468	31	67	778	1261	3172	1069	6	0	103
07	294	441	339	372	213	308	218	435	54	52	8	2
08	236	156	61	617	167	56	328	652	255	58	4	291
09	274	407	155	102	100	127	543	441	481	105	5	225
1910	348	272	200	309	113	257	366	528	68	2	0	173
11	839	172	702	174	59	124	190	252	148	39	168	76
12	413	127	272	244	230	47	343	302	12	14	40	119
13	210	342	223	340	145	251	291	445	65	29	82	138
14	139	654	393	487	262	327	1474	615	347	512	165	287
15	151	592	371	546	54	185	365	718	253	67	1	45
16	145	402	200	148	169	349	1043	1030	214	109	13	24
17	171	72	256	391	204	632	768	1086	906	417	1	257
18	81	89	854	661	16	244	370	517	75	53	.....	.....

TABLE 6—CONTINUED.

No. 14.—NORTHWEST FRONTIER PROVINCE.

YEARS.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1901	316	179	268	128	633	92	209	356	286	67	0	0
02	15	8	169	189	112	230	411	383	257	139	25	2
03	110	6	364	117	186	32	215	338	224	15	6	74
04	313	6	621	43	48	18	290	437	117	93	48	46
05	271	197	397	56	88	20	246	194	198	15	3	250
06	32	543	223	82	57	113	286	459	221	22	0	172
07	159	299	262	381	49	123	159	358	49	12	0	0
08	320	111	33	584	28	32	434	638	447	40	0	94
09	29	211	65	112	23	99	541	493	93	12	1	186
1910	380	90	50	219	50	207	584	644	32	0	0	39
11	383	38	707	95	28	114	47	227	124	92	95	50
12	253	103	26	222	44	38	418	381	59	23	2	9
13	16	229	135	62	56	164	205	392	96	14	37	60
14	61	334	171	328	139	204	675	358	170	368	69	153
15	2	232	202	438	39	88	122	196	147	70	0	8
16	47	171	92	151	160	66	301	794	179	57	1	9
17	70	4	218	89	102	152	212	714	279	20	0	131
18	10	26	454	285	5	117	146	198	74	7	.....	.....

No. 15.—BALUCHISTAN.

1901	174	15	89	16	162	0	106	22	6	0	0	0
02	2	2	26	20	10	47	28	63	60	17	22	28
03	70	72	282	160	73	11	81	36	11	0	11	13
04	269	49	335	7	0	2	6	9	9	0	20	7
05	388	191	172	20	10	4	43	0	9	2	3	263
06	39	391	294	16	3	26	30	99	30	0	10	12
07	1	330	108	113	2	118	42	191	0	0	0	6
08	123	11	104	93	3	3	177	108	1	0	0	67
09	71	172	83	72	4	21	98	12	41	0	0	142
1910	191	24	62	48	9	42	200	78	0	0	0	109
11	385	56	381	62	1	2	7	42	9	47	99	26
12	350	19	15	90	13	17	166	52	15	0	2	100
13	46	234	178	8	2	71	80	145	4	36	61	106
14	114	347	78	71	4	85	281	29	50	153	189	60
15	42	18	131	257	1	5	31	19	10	12	0	1
16	168	91	29	91	26	22	48	391	7	1	0	6
17	118	5	161	15	47	1	35	341	141	0	24	53
18	12	107	380	71	2	2	32	16	19	1	.....	.....

No. 16.—SIND.

1901	0	11	14	2	35	0	112	21	0	0	0	4
02	0	0	1	1	98	231	24	244	319	0	0	0
03	11	5	17	7	7	1	301	11	27	0	0	0
04	47	29	112	0	1	2	49	4	7	0	4	10
05	27	71	3	15	0	0	138	0	10	0	0	9
06	6	201	51	0	0	96	48	170	65	4	0	0
07	1	131	21	16	1	228	16	374	2	0	0	0
08	77	0	1	20	1	7	834	278	0	0	0	0
09	18	7	0	15	0	9	441	65	53	0	0	20
1910	47	0	0	9	3	118	566	156	1	0	0	0
11	6	0	59	0	0	10	0	15	7	1	5	0
12	35	0	0	6	5	27	238	189	12	0	0	0
13	0	65	17	0	0	36	939	517	228	3	1	73
14	0	80	3	4	23	154	274	3	45	16	6	2
15	0	7	40	35	0	0	31	1	42	38	0	0
16	8	0	0	0	9	49	191	698	139	5	0	0
17	3	2	17	12	124	31	88	442	569	124	0	0
18	0	0	33	5	0	0	0	92	7	0	.....	.....

TABLE 6—CONTINUED.

No. 17.—RAJPUTANA, WEST.

YEARS.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1901	34	0	3	0	15	12	333	237	6	14	0	
02	0	0	0	3	16	177	152	312	196	6	0	0
03	5	7	29	0	20	4	689	379	205	0	0	0
04	9	12	50	3	61	58	200	215	60	6	11	24
05	12	20	4	6	1	19	145	3	273	0	0	2
06	0	128	27	0	1	67	253	280	351	3	0	7
07	4	130	26	12	26	34	212	1089	1	0	0	0
08	38	1	0	6	22	124	940	1190	306	1	4	0
09	13	8	0	104	11	106	727	344	449	2	0	65
1910	8	0	0	17	1	302	231	632	41	3	0	0
11	5	0	119	1	0	113	11	62	240	25	8	0
12	35	0	0	7	21	102	519	457	73	27	12	0
13	0	24	8	0	60	217	232	309	126	1	0	33
14	8	8	0	29	16	204	503	238	210	24	14	0
15	30	91	64	1	2	71	95	93	51	122	0	0
16	5	1	1	7	65	86	271	808	403	76	0	0
17	6	5	7	51	229	305	441	971	860	308	0	3
18	2	0	14	3	4	25	23	189	22	1	.....	.....

No. 18.—RAJPUTANA, EAST.

1901	103	51	11	2	16	65	693	755	30	34	0	3
02	16	3	0	5	27	154	1102	428	496	46	0	7
03	11	2	6	0	45	82	738	917	537	114	0	0
04	14	18	92	1	104	168	1167	1079	223	3	30	76
05	27	45	14	7	6	53	398	114	300	0	0	14
06	1	98	40	0	9	259	853	291	763	5	0	13
07	37	176	42	61	45	68	451	1252	11	0	0	0
08	69	4	6	2	31	174	1679	1435	269	1	5	0
09	29	6	0	203	24	424	1133	665	319	4	0	105
1910	42	11	0	7	9	384	412	908	754	341	4	0
11	74	3	69	3	1	273	168	337	781	23	96	1
12	45	17	11	14	13	98	1202	996	317	5	14	7
13	0	62	7	2	195	347	465	307	97	6	2	75
14	0	3	4	15	39	334	1247	478	454	59	17	0
15	68	123	190	14	16	129	312	498	131	156	0	4
16	1	28	0	2	37	311	669	1701	497	99	11	0
17	16	37	21	46	290	461	1218	1556	1206	354	0	1
18	25	0	14	5	5	103	189	623	97	0	.....	.....

No. 19.—GUJARAT.

1901	0	0	2	6	21	214	886	652	76	48	0	0
02	10	0	0	2	4	106	830	1130	1048	12	4	42
03	0	0	1	0	34	94	1740	692	605	20	0	0
04	2	48	78	0	10	157	685	194	382	16	1	3
05	2	3	2	2	0	70	2100	116	257	6	0	0
06	0	46	0	0	0	688	1200	874	400	40	0	1
07	1	38	1	8	3	284	1276	1721	43	0	0	0
08	17	0	0	0	0	246	1880	1268	85	4	0	0
09	0	6	0	26	9	638	1473	712	588	8	0	26
1910	3	0	0	1	1	1041	1088	1177	170	78	23	0
11	10	0	84	0	3	554	223	297	193	1	7	1
12	0	0	0	2	3	406	2401	1067	150	33	127	0
13	0	0	0	0	32	1493	1463	632	505	4	0	1
14	0	15	0	1	27	927	1493	414	1035	38	23	0
15	21	6	52	7	6	445	476	306	184	380	2	0
16	0	0	0	0	30	400	687	1318	617	146	6	0
17	3	20	0	20	387	526	1129	1207	1158	954	0	0
18	2	0	1	0	43	139	393	561	50	2	.....	.....

TABLE 6—CONTINUED.

No. 20.—CENTRAL INDIA, WEST.

YEARS.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1901	112	62	19	10	10	102	965	1724	349	17	0	9
02	80	37	1	6	19	109	1659	685	792	79	25	22
03	15	1	1	0	43	174	947	1178	1008	458	0	0
04	13	48	99	0	49	348	1573	1041	449	55	14	53
05	48	15	34	12	13	97	1081	594	574	0	0	4
06	1	67	31	0	5	592	1494	672	1525	14	0	0
07	15	67	4	33	8	164	836	1343	122	0	26	0
08	57	2	28	4	4	343	1485	1159	178	0	3	1
09	12	5	0	106	29	599	1109	1083	388	8	0	69
1910	8	0	0	2	2	763	735	980	1019	173	103	0
11	70	5	12	0	2	487	475	569	798	46	118	0
12	16	22	2	1	10	199	1376	1064	329	11	234	7
13	0	35	5	0	124	665	1127	779	237	0	2	48
14	0	5	17	7	62	514	1483	557	578	26	45	0
15	47	106	106	23	22	359	595	850	288	273	12	16
16	0	28	0	1	68	742	911	2177	482	204	78	0
17	51	84	5	9	278	690	1192	1319	1063	345	0	0
18	3	3	10	0	34	354	461	876	261	1	.....	.....

No. 21.—CENTRAL INDIA, EAST.

1907	19	469	20	79	23	158	763	1875	27	0	14	0
08	78	58	15	1	28	141	2068	2328	314	55	1	21
09	87	46	8	250	10	951	1518	544	478	0	0	82
1910	24	1	1	12	58	692	560	1421	970	188	214	0
11	125	9	79	0	22	500	396	1365	1552	283	153	0
12	10	33	5	11	17	107	1790	1074	540	0	142	4
13	2	312	77	0	166	818	792	635	273	3	0	38
14	1	23	114	58	68	271	2095	972	310	9	1	0
15	60	117	96	29	28	499	800	1547	457	222	1	4
16	0	40	0	2	12	1012	927	1819	569	359	95	0
17	15	78	78	4	249	660	1571	1624	920	234	5	10
18	1	11	5	2	35	275	332	978	301	0	.....	.....

No. 22.—BERAR.

1901	211	16	65	48	21	578	942	1235	280	206	0	0
02	13	0	0	31	5	154	1087	681	401	197	92	155
03	31	4	0	6	183	374	1469	859	532	303	0	0
04	22	7	39	0	29	486	553	387	849	213	0	7
05	13	32	10	9	23	256	879	499	899	27	1	0
06	52	4	10	0	10	1019	1163	1130	305	24	37	86
07	5	317	4	129	2	646	884	878	98	2	63	1
08	2	9	94	33	4	780	990	991	660	1	0	8
09	7	37	14	38	84	535	889	517	684	26	0	292
1910	0	0	0	0	29	931	725	937	971	249	217	0
11	98	0	4	0	8	545	548	645	287	25	218	0
12	0	91	1	10	9	309	938	895	258	30	48	4
13	0	49	5	6	84	710	1208	622	537	44	1	127
14	0	55	42	45	73	1137	804	700	1100	19	37	63
15	120	22	283	83	32	729	901	413	657	411	29	124
16	0	29	2	7	119	922	1246	821	1081	345	145	0
17	4	212	76	16	170	789	884	639	1008	358	8	0
18	4	11	7	0	304	527	462	361	104	26	.....	.....

TABLE 6—CONTINUED.

No. 23.—CENTRAL PROVINCES, WEST.

YEARS.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1901	170	122	104	64	28	368	1395	2052	523	32	0	0
02	30	8	0	16	12	138	1238	867	827	106	116	66
03	24	14	0	6	185	413	1508	1458	976	400	2	0
04	6	72	130	0	37	584	984	784	650	157	0	32
05	36	37	40	50	37	255	1389	1010	1384	14	0	2
06	32	60	108	0	26	1208	1619	1146	874	19	18	44
07	30	330	7	135	21	497	889	1738	139	0	76	5
08	47	36	77	21	3	634	1541	1599	572	35	4	28
09	34	59	17	182	67	640	1233	965	553	4	0	237
1910	21	0	0	2	23	916	940	1319	1103	208	227	0
11	70	0	40	0	5	777	643	1092	1056	149	238	0
12	21	194	0	11	7	165	1489	1412	550	7	227	7
13	4	155	59	1	90	790	1289	1192	315	14	3	86
14	0	33	192	78	53	537	1607	1047	783	37	17	31
15	45	100	234	47	45	746	1449	1339	634	432	26	19
16	0	85	0	6	74	1058	1080	1523	1057	720	137	0
17	18	213	76	17	242	914	1284	1518	1411	313	0	6
18	4	28	11	2	162	941	809	984	295	5	.....	.....

No. 24.—CENTRAL PROVINCES, EAST.

1901	167	418	112	42	50	269	1397	1755	762	110	8	0
02	2	3	3	113	48	143	1679	1183	691	39	10	26
03	20	53	3	25	156	382	1453	1519	924	524	1	0
04	0	57	119	2	260	1455	1121	1618	419	268	4	0
05	210	107	84	104	104	135	1513	1062	1329	53	0	0
06	96	357	270	0	18	587	1803	985	971	148	23	41
07	20	146	83	238	12	803	1069	1797	427	0	36	60
08	36	185	9	2	18	910	1812	2202	714	51	0	10
09	20	38	26	376	25	823	2048	860	517	25	0	281
1910	11	1	4	26	42	1048	1340	1539	1132	248	255	0
11	21	0	49	0	12	1191	1037	1873	907	341	65	0
12	16	346	0	73	29	201	1910	2067	754	22	55	0
13	4	248	78	5	76	952	1365	1338	554	67	14	71
14	0	40	58	219	134	634	2046	1360	928	17	2	17
15	118	100	127	58	65	535	1485	1525	940	525	61	2
16	0	101	5	12	61	1114	1155	1442	783	637	107	0
17	4	330	103	44	164	1132	1542	1461	1120	560	3	3
18	43	16	11	15	225	2015	948	1481	498	2	.....	.....

No. 25.—KONKAN.

1901	.....	1	10	103	97	2687	4111	2820	426	211	37	9
02	1	0	3	9	50	1606	3789	2023	2422	378	128	250
03	0	0	1	5	767	1696	5135	2565	1125	514	64	9
04	0	1	25	25	65	3537	2955	1407	837	359	1	0
05	0	1	0	10	4	1156	3120	1341	770	366	70	0
06	35	4	6	1	10	2072	4171	1936	876	173	37	61
07	6	4	2	118	12	2336	4626	3301	678	93	38	5
08	3	4	1	44	25	1746	5560	2594	819	109	8	0
09	1	0	10	8	111	2911	5062	1418	1461	108	49	1
1910	0	0	6	1	35	3119	1729	2964	1418	562	148	0
11	1	0	8	4	62	2032	2289	2825	631	192	89	17
12	0	0	0	38	116	2321	5083	2253	559	330	390	0
13	0	1	1	10	65	3467	4207	1345	730	569	4	0
14	0	3	0	12	31	2610	5753	3064	2024	107	94	22
15	1	18	25	71	74	3092	2788	1414	1465	573	78	5
16	0	0	1	30	146	3067	2768	3270	2251	837	485	0
17	0	76	10	8	93	3113	2711	3463	2380	1628	123	0
18	3	0	15	12	1269	1284	1588	2207	424	59	.....	.....

TABLE 6—CONTINUED.

No. 26.—BOMBAY DECCAN.

YEARS.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1901	.....	15	28	140	154	426	782	701	356	296	20	2
02	26	0	0	32	72	399	806	420	592	288	148	268
03	26	0	0	14	303	342	1036	596	548	316	44	18
04	1	20	12	22	104	456	522	258	706	343	0	1
05	0	6	1	18	118	266	953	338	223	199	32	0
06	40	3	16	3	54	668	765	758	375	126	55	84
07	3	11	8	233	15	423	919	914	503	37	32	9
08	1	0	16	47	49	321	938	576	642	74	14	0
09	5	0	15	10	168	620	886	430	517	165	30	19
1910	0	0	11	4	83	660	663	901	691	351	123	0
11	6	0	14	6	97	511	503	521	132	165	145	27
12	0	3	0	80	109	326	1185	559	255	400	219	1
13	0	1	0	52	199	878	761	310	349	230	5	17
14	0	2	2	32	95	593	1333	853	733	96	156	43
15	40	19	64	105	93	719	869	310	819	284	122	57
16	0	1	2	44	248	485	911	616	748	576	465	0
17	0	70	28	32	64	609	402	651	904	634	191	0
18	23	1	12	27	372	211	226	394	269	73	.....	.....

No. 27.—HYDERABAD, NORTH.

1901	38	.....	.....	.....	.....	.....	.....	.....	.....	281	2	.....
02	.....	.....	.....	.....	.....	.....	.....	650	.....	.....	.....	.....
03	.....	.....	0	.....	.....	376	.....	1054	735	.....	.....	37
04	0	.....	.....	.....	46	452	568	268	1166	327	0	0
05	2	28	23	72	.....	352	28	929	795	.....	.....	0
06	130	1	34	0	14	1002	927	637	406	92	64	86
07	4	19	12	287	0	558	695	861	299	1	11	36
08	6	5	35	9	13	355	681	658	1523	1	0	1
09	16	10	18	81	65	669	872	590	586	46	1	48
1910	0	0	2	0	69	851	727	663	1593	270	149	0
11	15	0	10	1	9	415	789	765	383	23	90	3
12	0	93	0	47	36	201	902	640	262	78	80	0
13	0	38	0	64	106	550	1105	329	320	154	0	44
14	0	20	3	14	42	1117	1003	771	1132	54	43	71
15	103	6	259	62	35	775	509	574	1055	392	59	32
16	0	31	6	14	135	637	1261	544	1106	486	228	0
17	1	284	88	69	123	692	937	927	1313	356	134	0
18	34	1	14	17	405	324	457	423	465	11	.....	.....

No. 28.—HYDERABAD, SOUTH.

1901	26	167	14	168	291	430	625	347	289	248	71	.....
02	.....	.....	.....	.....	.....	.....	.....	576	.....	.....	.....	.....
03	.....	.....	0	.....	.....	234	.....	1037	851	.....	.....	43
04	1	.....	.....	.....	106	460	524	167	680	279	0	0
05	0	24	29	75	.....	438	219	843	330	.....	.....	0
06	156	0	8	12	27	706	570	808	490	238	47	214
07	4	6	69	504	13	522	509	687	347	4	26	48
08	57	15	14	15	10	369	495	573	1849	18	0	0
09	3	0	4	151	58	553	702	624	676	31	0	0
1910	0	0	5	37	65	582	412	754	766	339	175	0
11	0	0	1	18	106	336	655	448	385	83	61	18
12	0	140	0	103	35	121	837	690	347	92	140	0
13	0	12	0	19	192	205	836	236	235	240	1	0
14	0	0	9	48	121	717	1068	850	945	54	35	24
15	59	33	250	56	101	575	600	749	886	746	94	1
16	0	10	0	115	111	682	1107	433	1105	1097	406	14
17	0	130	160	88	191	529	595	769	946	510	75	0
18	56	0	76	71	367	163	319	269	693	18	.....	.....

TABLE 6—CONTINUED.

No. 29.—MYSORE.

YEARS.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1901	29	116	30	212	392	1236	2136	839	634	840	456	76
02	0	24	77	308	458	758	2386	604	940	848	234	580
03	2	0	11	68	602	832	2839	1062	798	777	856	198
04	6	10	40	268	601	1650	1888	632	604	550	12	3
05	4	41	58	95	560	1078	1476	818	358	726	127	1
06	90	9	9	50	300	832	2165	1610	505	818	103	192
07	19	0	45	349	192	459	785	699	586	225	210	54
08	54	13	34	172	367	320	840	384	290	266	6	2
09	86	4	22	174	638	464	862	788	403	487	146	40
1910	0	3	30	95	359	433	972	848	416	901	328	0
11	2	1	22	109	519	574	821	298	213	668	142	28
12	3	18	12	160	276	476	1065	673	716	762	241	0
13	0	0	5	77	365	442	893	350	604	484	5	15
14	0	3	8	70	247	226	1092	539	391	456	261	95
15	40	9	134	169	264	829	655	263	687	409	348	37
16	0	0	0	87	572	623	747	783	544	660	613	27
17	1	144	60	73	227	603	369	660	1040	588	367	5
18	48	4	63	187	402	239	184	378	378	161	.....	.....

No. 30.—MALABAR.

1901	113	121	198	538	526	3146	2692	1346	660	880	1354	162
02	58	10	180	285	459	1574	4242	1147	1914	1296	620	483
03	12	54	20	312	858	2084	3703	1458	1168	1207	552	262
04	96	12	104	258	758	3941	2733	1130	806	1068	83	37
05	6	72	26	388	910	3111	2031	1178	702	1388	316	2
06	96	28	48	48	540	1614	3380	1588	526	966	640	316
07	28	1	83	509	256	3634	3940	4873	643	803	680	150
08	4	50	57	317	394	2931	5925	2296	452	621	57	20
09	165	13	35	188	2026	3775	4412	1142	899	590	467	88
1910	3	17	36	250	487	3753	2229	2305	1248	1103	747	0
11	4	8	22	98	562	4281	3284	1361	252	992	395	183
12	7	5	6	513	654	4141	4272	3055	561	1513	373	14
13	0	9	11	121	613	2800	3652	1206	814	1705	147	83
14	0	0	7	10	356	2696	4876	2476	979	1296	364	344
15	26	21	110	262	428	3128	3382	1487	1329	770	983	26
16	0	8	12	191	702	4493	2403	1996	1629	1135	516	29
17	0	194	119	84	401	3885	2089	1636	1914	1301	636	60
18	18	10	61	75	3109	2327	986	1674	481	622	.....	.....

No. 31.—MADRAS, SOUTHEAST.

1901	89	152	84	136	272	117	146	242	861	449	540	329
02	289	39	71	82	505	137	143	472	300	1139	740	429
03	82	32	6	69	473	205	212	408	792	547	783	768
04	135	0	2	68	457	95	291	133	281	613	102	16
05	24	26	69	253	310	158	123	367	234	941	587	16
06	202	50	59	31	139	154	247	714	234	657	753	505
07	31	5	80	297	188	1463	237	189	455	633	892	268
08	57	143	86	73	241	121	130	181	659	1091	174	108
09	457	38	19	243	447	93	118	853	469	511	281	86
1910	35	81	5	91	202	171	582	578	203	1072	615	2
11	16	3	17	111	251	204	160	128	496	490	777	569
12	29	10	10	42	215	139	107	280	435	987	1117	110
13	14	13	19	75	218	94	177	237	500	865	832	545
14	26	8	16	142	191	138	99	395	492	1200	529	557
15	152	90	173	133	193	206	447	311	515	334	997	269
16	0	13	13	70	204	89	634	450	368	786	633	143
17	70	135	117	35	278	245	172	622	584	499	707	209
18	405	28	86	31	286	138	145	198	189	257	.....	.....

TABLE 6—CONTINUED.

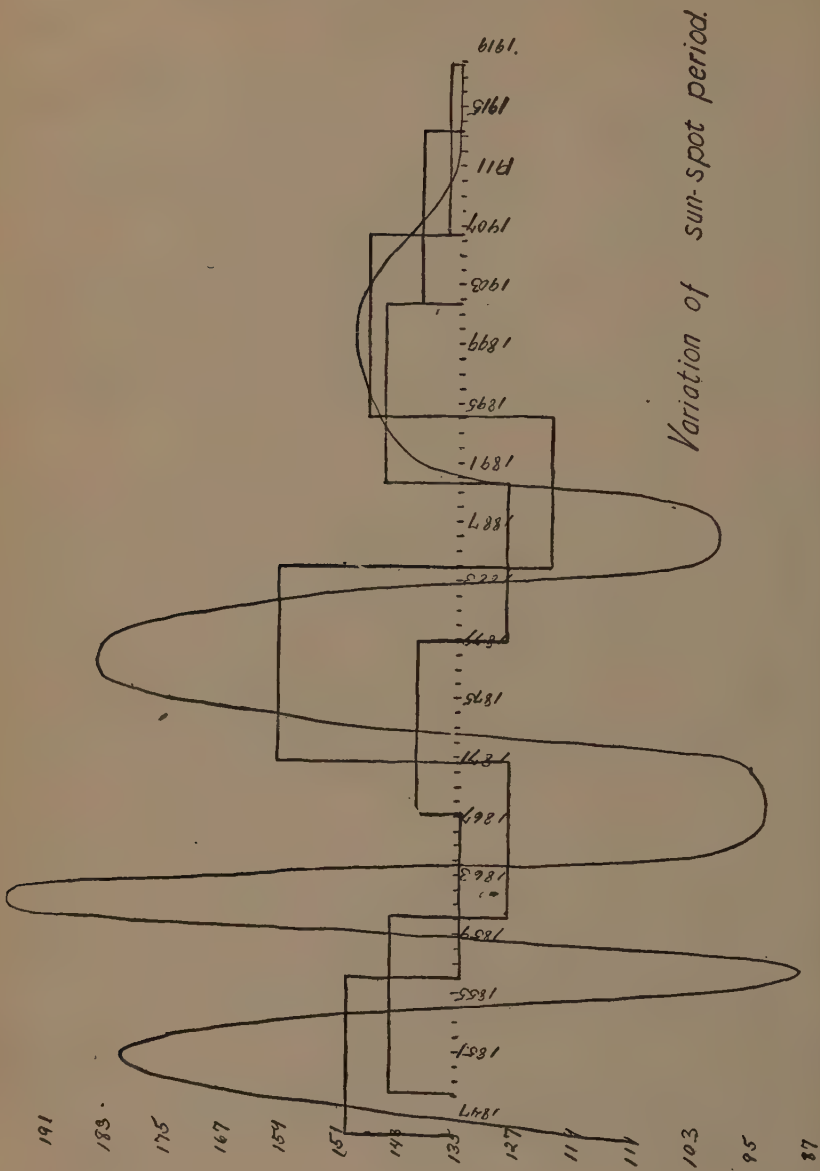
No. 32.—MADRAS, DECCAN.

YEARS.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1901	25	193	1	58	254	242	262	208	403	271	275	61
02	15	0	3	79	154	321	161	354	653	626	126	76
03	36	0	0	30	225	266	461	479	803	408	790	96
04	26	0	11	49	248	184	248	98	318	472	0	12
05	5	19	50	53	147	300	161	867	483	486	219	1
06	113	2	4	3	50	351	456	532	551	376	59	395
07	2	0	16	258	10	213	477	153	379	89	281	73
08	21	66	36	25	147	146	287	163	886	249	8	2
09	159	1	3	145	250	162	242	883	731	82	25	1
1910	0	0	5	36	153	173	600	668	865	516	339	0
11	0	0	3	53	202	234	309	239	382	285	124	35
12	0	20	2	56	72	139	299	453	659	419	468	0
13	0	0	0	30	249	191	404	94	474	531	1	78
14	0	0	2	59	175	190	338	517	621	132	133	25
15	109	14	212	52	185	227	502	213	774	277	529	6
16	0	2	0	34	218	228	828	623	716	1027	340	1
17	5	227	35	24	172	360	185	605	851	635	313	10
18	61	1	17	40	294	86	85	238	607	19	.....	.....

No. 33.—MADRAS, COAST NORTH.

1901	47	304	15	1	189	210	453	468	450	460	970	224
02	8	0	10	102	84	247	463	770	680	1208	610	400
03	48	23	3	20	368	410	762	731	722	558	1389	274
04	216	4	15	11	416	308	402	386	420	685	18	114
05	16	50	45	104	180	308	302	624	596	368	568	6
06	335	61	55	10	45	583	574	692	413	428	157	869
07	5	9	3	284	86	788	515	615	362	209	331	206
08	197	168	11	34	156	280	528	795	1073	465	85	8
09	113	13	6	438	156	460	828	739	690	96	26	263
1910	4	6	2	119	95	707	909	848	788	1149	336	0
11	0	1	35	55	109	579	571	480	719	522	427	127
12	5	62	16	79	127	219	872	993	774	473	388	3
13	0	47	4	31	251	448	787	529	507	904	79	104
14	4	21	22	273	367	688	728	778	1129	143	131	18
15	169	66	228	119	197	615	574	903	685	793	972	6
16	1	10	2	81	152	576	1027	886	641	1358	532	8
17	7	116	41	97	353	825	609	816	944	1080	491	51
18	151	17	40	53	331	475	462	599	595	88	.....	.....

FIGURE 1.



RAINFALL PERIOD.
Dinsmore Alter.

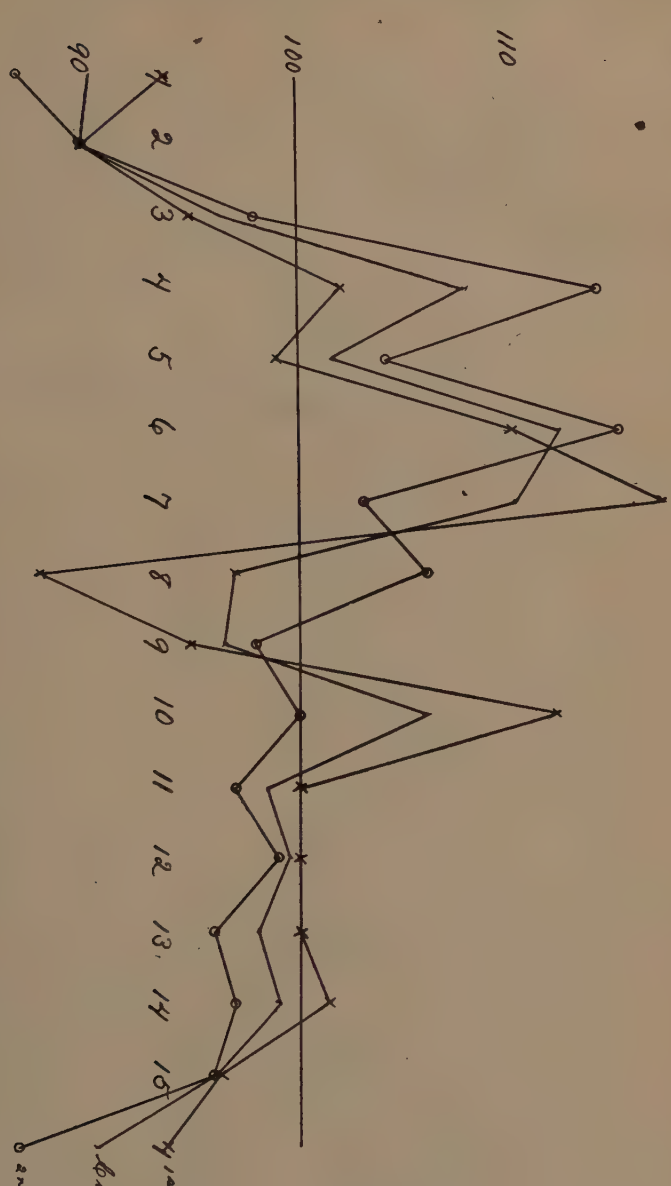
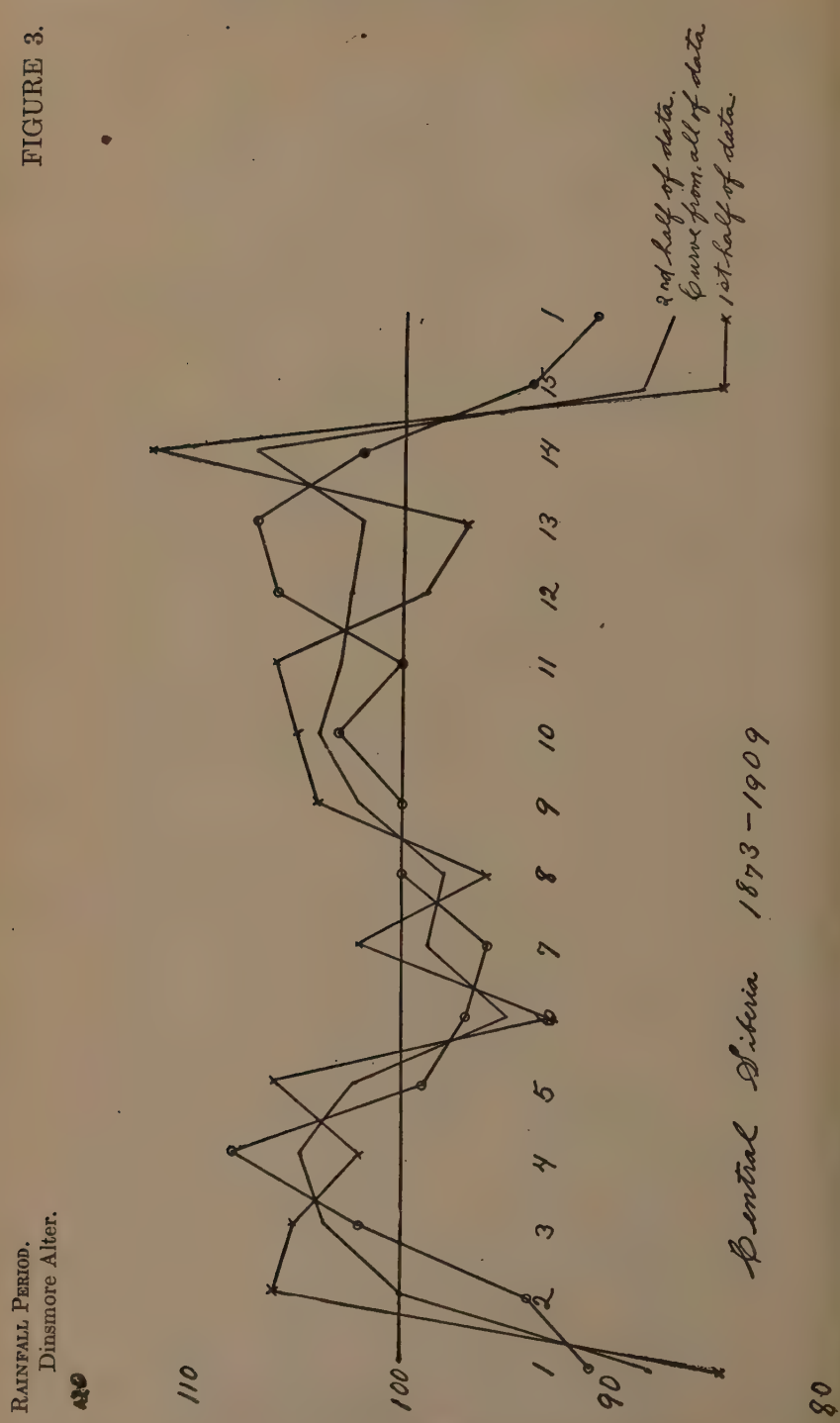

Rainfall Period.
Dinsmore Alter.
120
110
100
90
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
1st half of data
Same from all of data.
2nd half of data

FIGURE 2.

FIGURE 3.


Rainfall Period.
Dinsmore Alter.
110
100
90
80
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
1
2nd half of data.
Curve from all of data
1st half of data.
Central Siberia 1873-1909

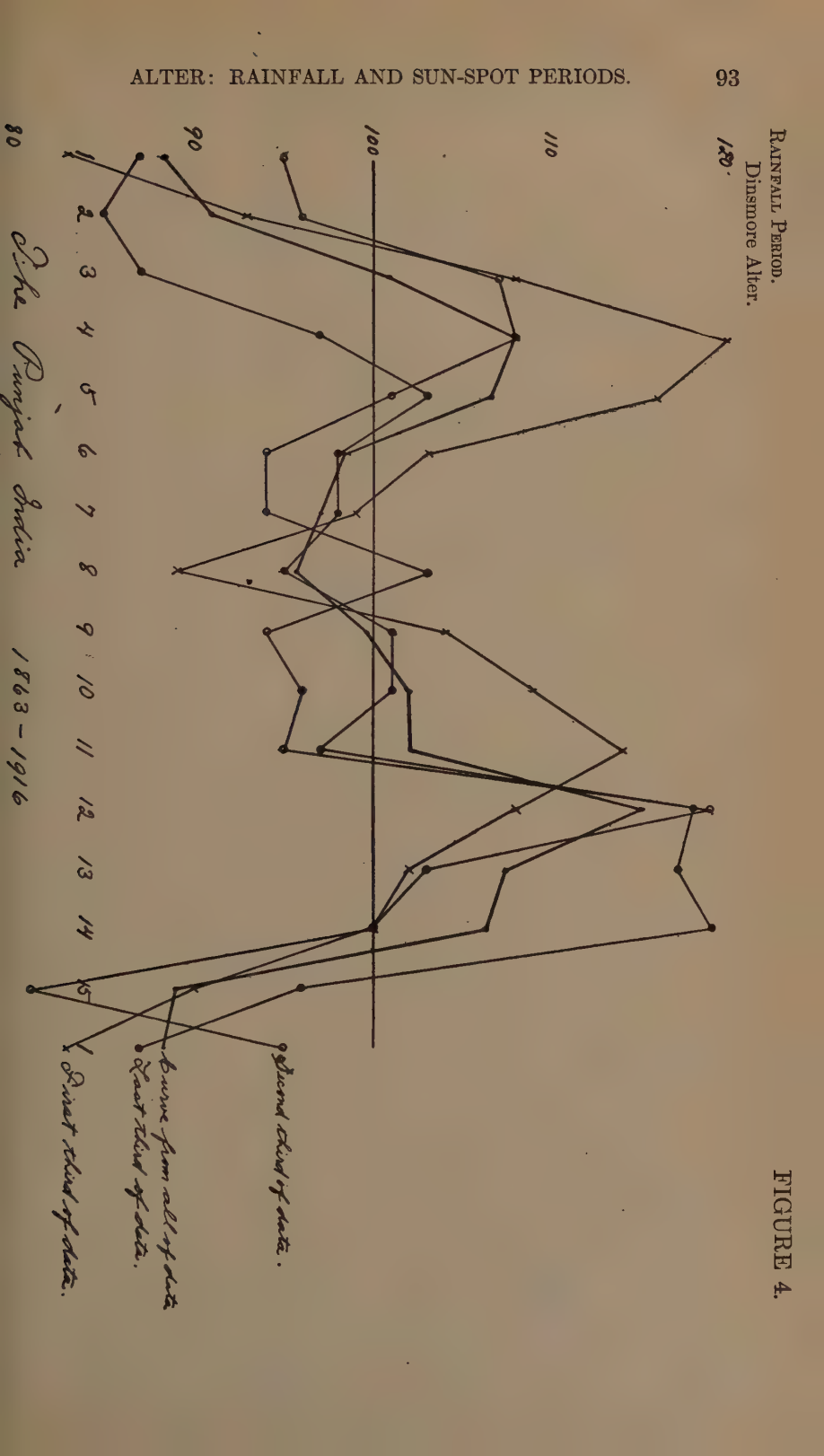
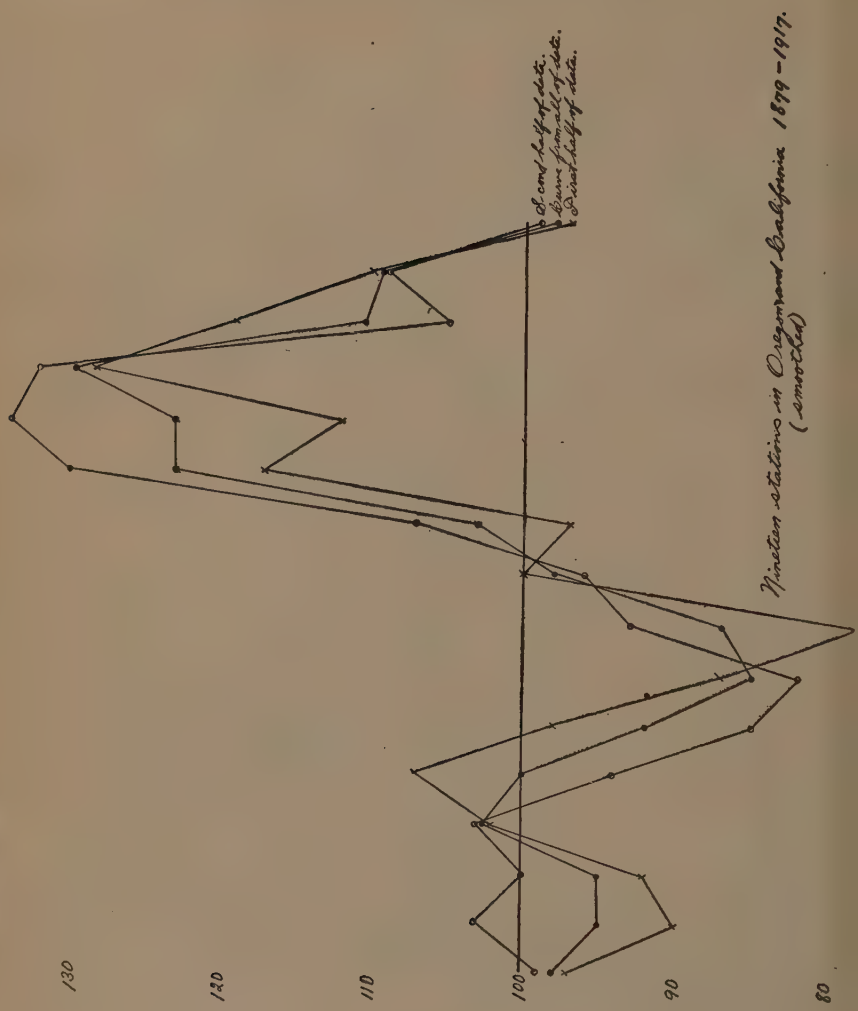

Rainfall Period.
Dinsmore Alter.
120
110
100
90
80
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
Second third of data.
Burns from all of data
Last third of data.
First third of data.
The Punjab India 1863-1916

FIGURE 4.

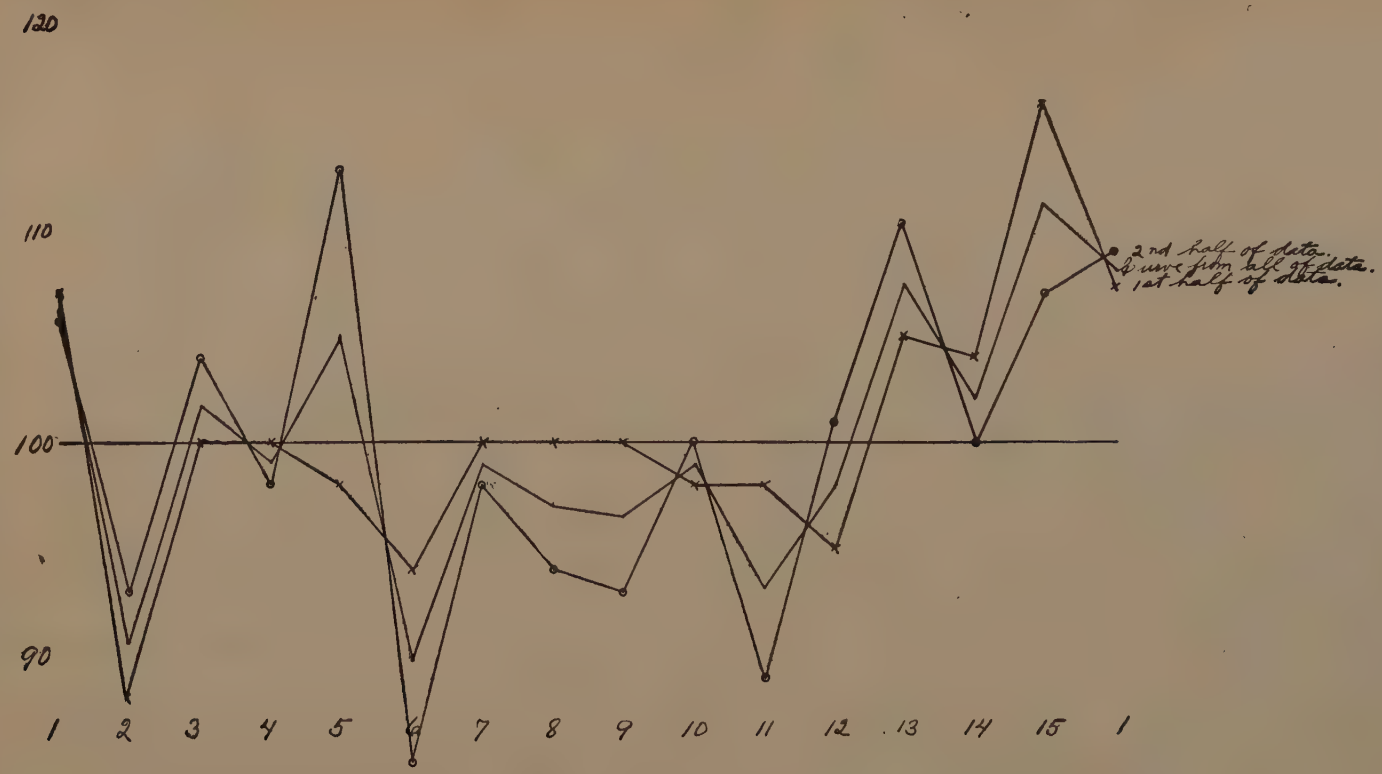
FIGURE 5.

RAINFALL PERIOD.
Dinsmore Alter.



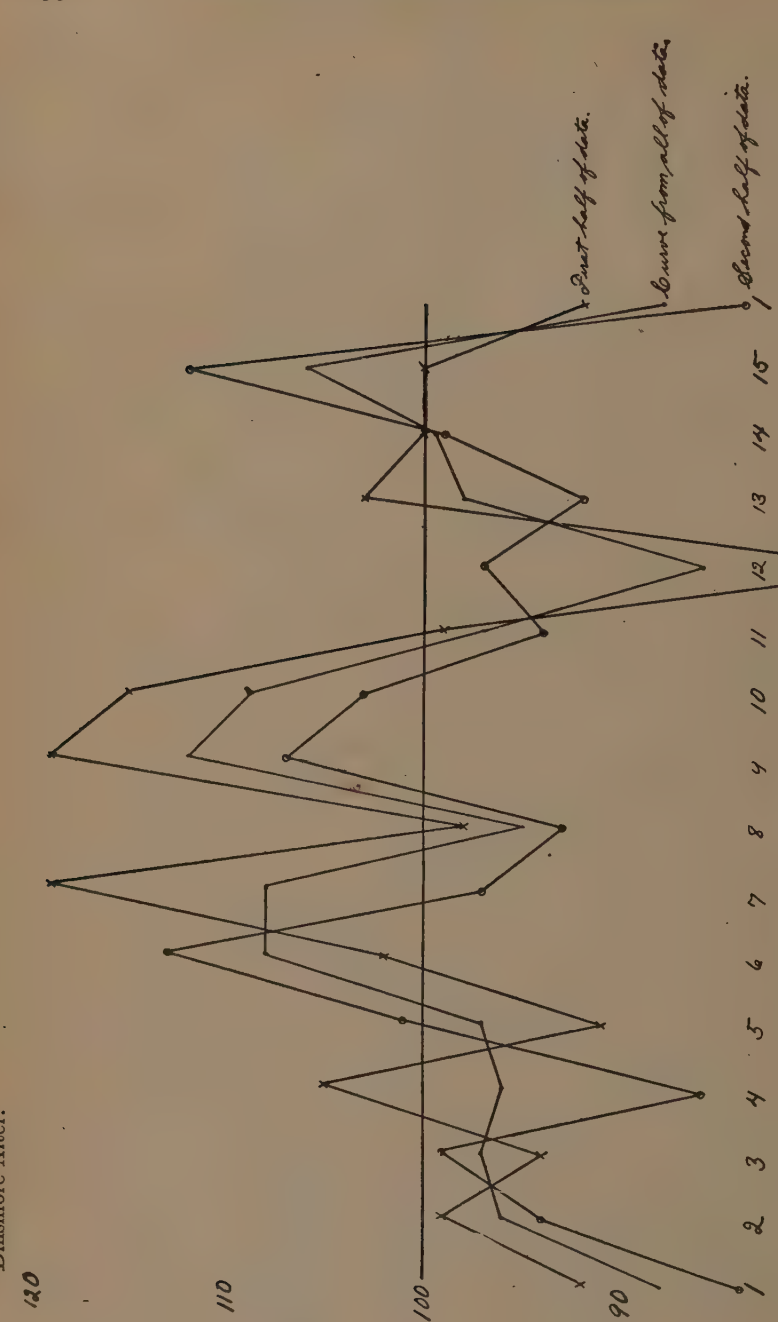
RAINFALL PERIOD.
Dinsmore Alter.

FIGURE 6.



Data from England, Holland, Denmark and Sweden 1861 – 1917.

FIGURE 7.


Rainfall Period.
Dinsmore Alter.
120
110
100
90
80
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
Two to five stations in Ohio
1862 - 1917.
First half of data.
Curve from all of data.
Second half of data.

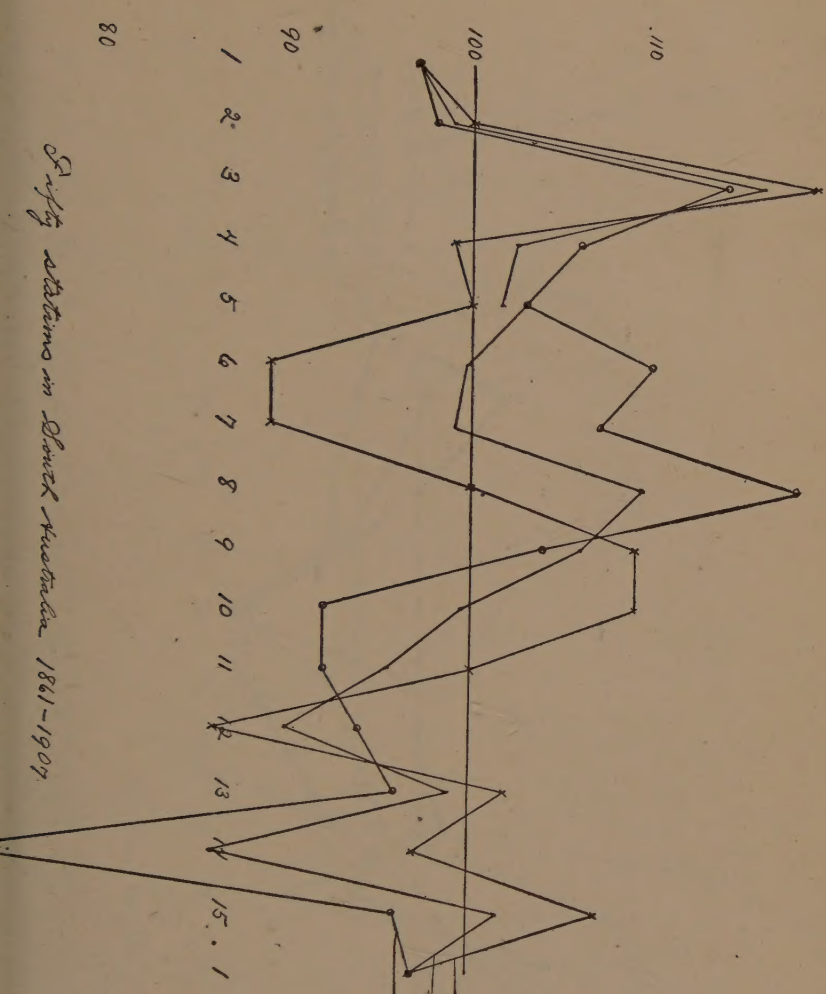
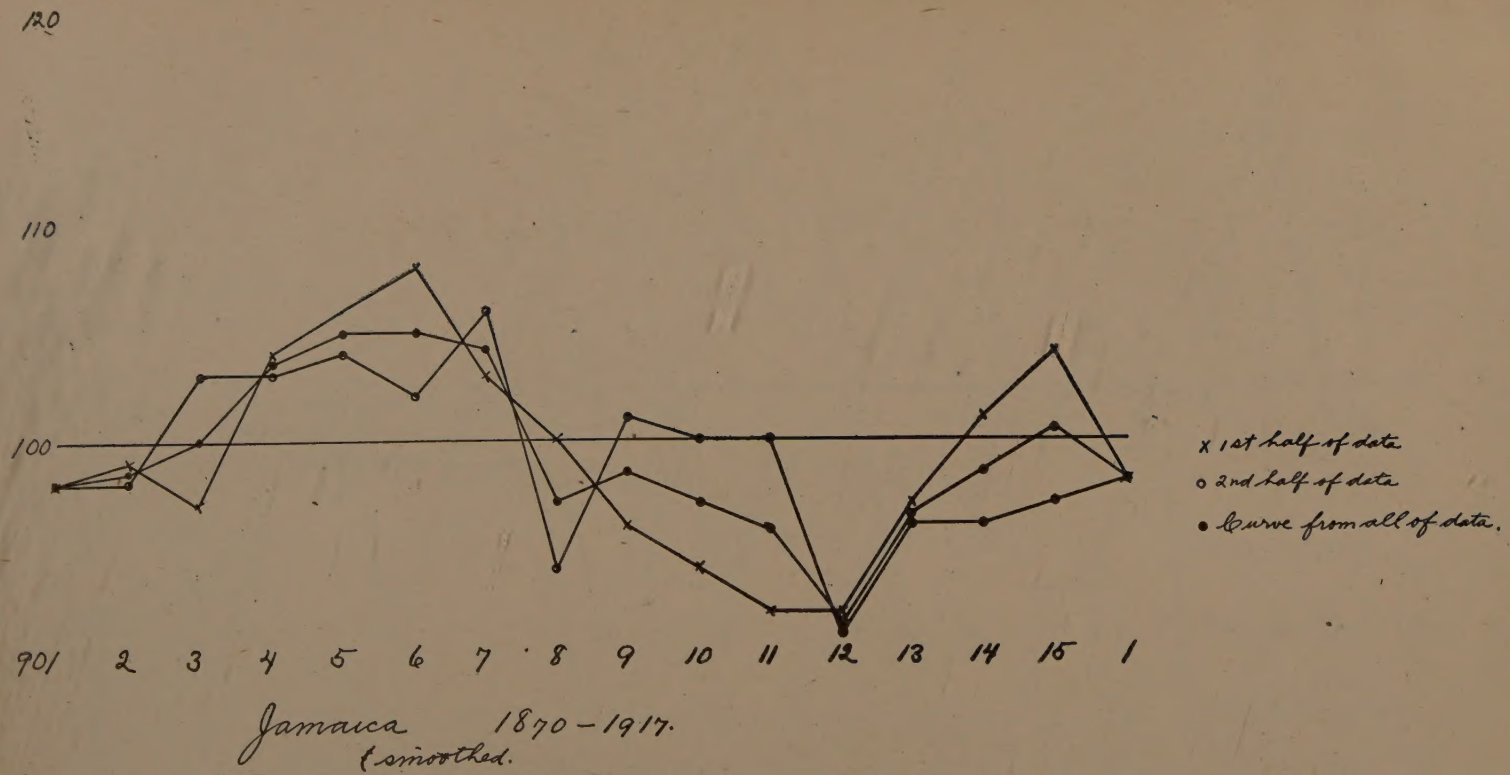

RAINFALL PERIOD.
Dinsmore Alter.
120
110
100
90
80
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 . 1
1st half of data
Curve from all of data.
2nd half of data
Fifty stations in South Australia 1861-1907

FIGURE 8.

RAINFALL PERIOD.
Dinsmore Alter.

FIGURE 9.



RAINFALL PERIOD.
Dinsmore Alter.

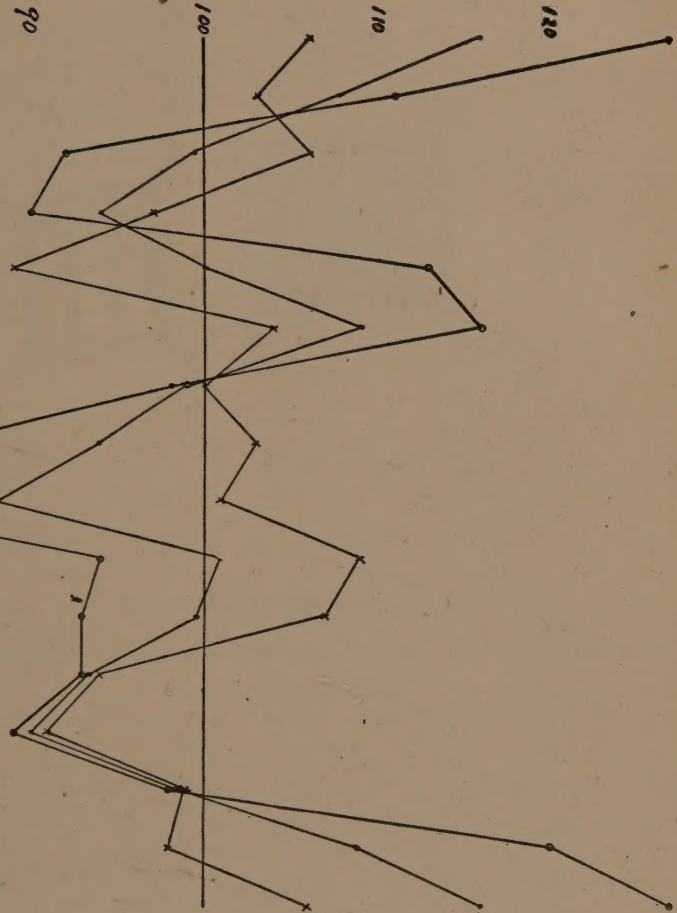



FIGURE 10.